THE REFINER AND NATURAL GASOLINE MANUFACTURER

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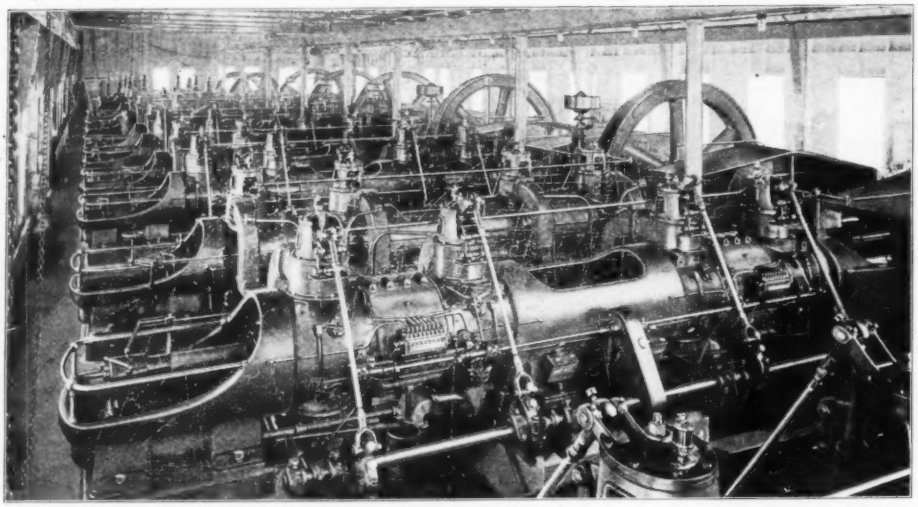

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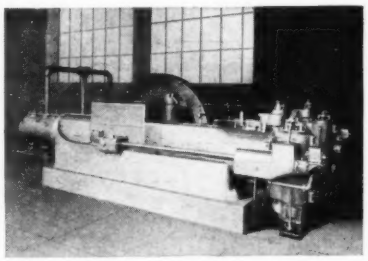

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Gasoline Men Have Real Meet at Fort Worth

Fall get-together brings out some constructive thought—Conditions not near so bad

By H. H. King

Fort Worth, Texas.—Attended by representatives of the natural gasoline manufacturing industry in the principal producing sections of the country, the regular fall conference held here by the Association of Natural Gasoline Manufacturers on November 15 and 16 has been acclaimed by both officers and members of the organization as one of the most instructive and successful meetings in its history. The meeting is the first ever held in Texas, and attracted a number of plant owners and employes from both Texas and Louisiana that had not previously availed themselves of the opportunity to participate in the conferences, during which technical papers are read and general discussions held on common problems confronted by the industry. The large attendance of members of the industry from Oklahoma and Kansas was especially noticeable. The officers of the association who were elected at the conference held last April at Tulsa were present throughout the meeting.

Chase Is Chairman

Presiding as chairman at the opening session, F. L. Chase, Lone Star Gas Company of Dallas, and vice president of the association, included in his welcoming address a brief outline of the history of the comparatively young organization and its purpose in the natural gasoline manufacturing industry. Misleading information regarding natural gasoline products, heretofore, reaching the public in general has been materially checked by the association, while much good has been done toward placing the industry on a more stable basis. The membership has experienced a steady and substantial growth, and now includes representatives of all the principal natural gasoline manufacturing centers in the country, according to Chase.

D. E. Buchanan, Chestnut & Smith Corporation of Tulsa and president of the association, read an interesting paper on the value of trade associations, and substantiated his views with details of some of the direct benefits the natural gasoline manufacturers are receiving today through the diligent work of their association. As the membership of the Association of Natural Gasoline Manufacturers increases in number each year, it is possible to enlarge its scope of operations far beyond those of the present, which have already proved to be of an almost inestimable value to the industry.

General Discussion

In connection with the paper prepared by Buchanan other members were called upon by the presiding chairman to express their views on the same subject. W. M. Welch, Tidal Refining Company of Tulsa and first president of the association, spoke from actual experience in association work dating back a number of years when a small group of natural gas men and himself from Kansas and Missouri organized the Natural Gas Association of America. This latter organization has since increased its membership to approximately 3500, and is represented in nearly all the gas producing states in the country, according to Welch. It also has an auxiliary for supply men. Welch also stressed the importance of having the full co-operation of the entire membership to make it a success, while all plant superintendents and engineers as well as executives of natural gasoline manufacturing concerns should avail themselves of the opportunity of the semi-annual conferences in order to have open discussions on their problems.

S. C. Carney, Roxana Petroleum Corporation of Tulsa, recommended that more attention be given to broad and general subjects of a technical nature during the association's conferences, and also predicted that a reaction in the natural gasoline market will take place in the near future, resulting in stabilization of the market, and that the association can accomplish much to that end. Suggestions were made by R. R. Owens, Marland Refining Company of Ponca City, that more attention be given by the Association toward equalizing freight rates on natural gasolines, and curtail unfair legislation thrust upon the industry in some states. The needs of more accurate methods for the testing of casinghead gas before the manufacturers make contracts for same with the producers were included in the recommendations made by E. L. Peck, Empire Gasoline Company of Bartlesville. In substantiating the value of the association to the natural gasoline manufacturers, W. N. Melton, Liquified Petroleum and Gas Company of Tulsa and formerly connected with the association, recalled an instance whereby great sums of money had been saved for the industry through the sole efforts of the association in convincing the United States Bureau of Explosives that it was not necessary to reduce the vapor pressure in tanks cars from 10 to eight pounds. Embey Kaye, Skelly Oil Company of Tulsa, emphasized the educational value of the semi-annual conferences held by the association, and how they have served to bring about better relations among men in the industry.

Charcoal Process

A lengthy paper prepared jointly by G. G. Oberfell and R. C. Alden, consulting engineers of Tulsa, on the subject of "The Uses and Limitations of Charcoal Process Plants," was read by the former at the afternoon session of the first day of the conference, and

Those in attendance at the fall meeting of the Association of Natural Gasoline Manufacturers held in Fort Worth

THESE GASOLINE MEN WERE THERE

Registration of members of the association and interested guests at the opening session Thursday morning included the following: J. P. Benkendorfer, World Gasoline Company, Desdemona; F. L. Chase, Lone Star Gas Company, Dallas; A. C. Taylor, Central Texas Petroleum Company, Ft. Worth; D. E. Buchanan, Chestnut and Smith Corporation; G. O. Irvine, Galena Signal Oil Company, Houston; George P. Gleeson, Central Gasoline Prod. Company, Fort Worth; W. D. Carpenter, Lone Star Gas Company, Dallas; Emby Kaye, Skelly Oil Company, Tulsa; F. B. Crawley, Tidal-Western Oil Corporation, Burkburnett; George P. Bunn, Phillips Petroleum Company, Bartlesville; M. Lloyd Freese, Altitude Petroleum Company, Tulsa; H. A. Melat, Gulf Production Company, Fort Worth; Charles E. Bowles, D. E. Foster Company, Tulsa; Chas. F. Roeser, Roeser & Pendleton, Breckenridge; D. E. Foster, Tulsa; Jno. J. Roberts, H. H. Howard, G. B. Ford, John Methenheimer, all Allied Chemical Company, Dallas; Robert Rose, General American Tank Car Corporation, Chicago; W. E. Reardon, Southern Carbon Company, Monroe; H. W. Price, J. M. Huber Company of Louisiana, Inc., Swartz, Louisiana; I. Deogin, J. M. Huber Company of Louisiana, Inc., Swartz, Louisiana; R. H. Fash, The Fort Worth Laboratories, Fort Worth; W. N. Corbett, Eagle-Picher Lead Company, Henryetta, Oklahoma; R. R. Owens, Marland Refining Company, Ponca City; D. W. McKay, Hope Engineering and Supply Company, Tulsa; S. C. Carney, Roxana Petroleum Corporation, Tulsa; F. F. Ketchum, Westova Oil and Gas Company, Breckenridge; W. M. Welch, Tidal Refining Company, Tulsa; T. P. Fenelon, Jr., Central Texas Petroleum Company, Fort Worth; W. N. Melton, Liquified Petroleum Gasoline Company, Tulsa; E. L. Peck, Empire Gasoline Company, Bartlesville; W. A. Schlenter, Tulsa; E. McCune, Sun Oil Company, Dallas; A. S. Johnson, Sun Oil Company, Dallas; E. A. Landreth, Landreth Gasoline Company, Breckenridge; T. F. Hudgins, C. & G. Cooper Company, Mt. Vernon; F. M. Devin, C. & G. Cooper Company, Dallas; E. F. E. Schmidt, Lone Star Gas Company, Dallas; E. Brunner, Hope Engineering and Supply Company, Mt. Vernon; George A. Seaman, Industrial Construction Company, Tulsa; H. W. Wahl, Dallas; W. F. Owens, Fort Worth Gas Company, Fort Worth; M. Farnsworth, Texas Pacific Coal and Oil Company, Thurber, Texas; R. W. Gilchrist, Central Texas Petroleum Company, Fort Worth; R. W. Deacon, St. Louis Surfacer and Paint Company, St. Louis; G. E. Murphy, Empire Refineries, Inc., Tulsa; L. E. Hirt, Hirt & MacDermott, Inc., Fort Worth; W. T. MacDermott, Hirt & MacDermott, Inc., Fort Worth; Bob J. Sharpe, General American Tank Car Corporation, Tulsa; A. V. Bourque, secretary, Tulsa; Fred G. Yonkers, Chestnut & Smith Corporation, Eastland; R. M. Coyle, Chestnut & Smith Corporation, Ranger; J. B. Simler, Bruce-MacBeth Engine Company, Tulsa; H. E. Randall, Bruce-MacBeth Engine Company, Ft. Worth; M. E. Mockby, Amerada Petroleum Corporation, Tulsa; S. G. Sanderson, Gypsy Oil Company, Tulsa; L. A. Greene, Radio Petroleum Company, Fort Worth; H. A. Presson, Hirt & MacDermott, Inc., Fort Worth; L. C. Rroades, Bessemer Gas Engine Company, Fort Worth; R. R. Rosier, Akin Gasoline Company, Tulsa; Clifford Mooers, Burkburnett Gas Company, Burkburnett; C. B. Savaga, Shield Petroleum Company, Breckenridge; G. G. Oberfell, Tulsa; Robt. J. Lindsay, Hope Engineering and Supply Company, Mt. Vernon; Alex Clarke, Arab Gasoline Corporation, Eastland; W. G. Cummings, Gas Engineering and Construction Company, Tulsa; C. P. Clark, Clark Brothers, Olean, New York; James K. Helmar, Radio Petroleum Company, Fort Worth; W. H. Harrison, Dixie Gasoline Company, Cisco; and J. M. Bradshaw, Penn-Okla Oil Corporation, Wichita Falls.

was generally approved as one of the best prepared papers ever tendered since the association begain its conferences. Following a brief introduction the paper explained the source and supply of charcoal, which is made almost exclusively from cocoanut shells, and also included production comparisons with other processes. The costs of installation and operation of plants using the charcoal process as compared with other processes in use created close attention of the members, while the uses and limitations of the charcoal process were given in condensed form. This paper will appear in The REFINER AND NATURAL GASOLINE MANUFACTURER.

Timely Article

The general discussion that took place among the members following the presentation of the paper by Oberfell indicated that it was a timely subject, and that considerable study has been devoted to it lately by technical men in the industry. Among those taking part in the discussion was I. Drogin, J. M. Huber Company of Swartz, Louisiana, who has lately availed himself of the opportunity to make a comparative test of both the absorption and charcoal processes in the Monroe gas field, but reported that his experience has been more favorable with the former process in that particular gas field. A number of questions regarding the charcoal process were put to Oberfell, who showed no hesitancy in making clear and detailed answers.

Although the city of Fort Worth was wrapped up in a holiday spirit due to celebration of its diamond anniversary, a full attendance of members and guests of the association was obtained at the the Texas Hotel, with vice president Chase presiding as toastmaster. Sidney L. Samuels, Fort Worth attorney, was the principal speaker on the program, although short talks were made by the toastmaster; D. E. Buchanan, president of the association, and W. M. Welch, retired president. The after-dinner speeches were curtailed in order for the officers and members to adjourn to the University Club, where a stag party was given by the Central Texas Petroleum Company of Fort Worth with all the visitors as its guests.

Blending Methods

The closing session of the conference was called to order Friday noon, with a luncheon in connection, and W. M. Welch presiding. Owing to sickness in his family, H. R. Noble, vice president and general manager of Shreveport Producing & Refining Company, was unable to attend the conference and deliver a paper prepared on experience in blending. The paper was forwarded to secretary Bourque, however, and was later read by D. E. Foster, Tulsa. The paper included tables of comparison on losses involved when different methods are used in blending natural gasolines with naphtha.

A. V. Bourque, who has served as secretary of the association since its organization in 1921 and an important factor in its present growth and success, delivered a paper entitled "Statistics: Their Place in Modern Business". The purpose of this paper was to emphasize the importance of statistics used by the association in its work, and their value to members of the natural gasoline industry when complete reports can be obtained. Assuring the members of the industry of a continuation of the association's strict policy in keeping strict confidence of all information and statistics compiled, Bourque asked for better and more prompt co-operation on the part of the plant owners in tendering statistics in the future. Whether members of the association or not, Bourque explained that statistics on the industry as a whole would be exchanged at all times with the plant owners.

Carbon Black

Since the carbon black industry has been permitted to operate in Texas and three plants have been erected during the past three months by concerns also engaged in manufacturing natural gasoline, a talk on the carbon black business by H. W. Price of J. M. Huber Company, Inc., Swartz, Louisiana, proved of great interest. At the close of Price's lecture a number of questions were asked by plant owners from Texas regarding recovery of black from residue gas and as compared with dry gas, and condition of the carbon black market. W. E. Reardon of Southern Carbon Company, Monroe, Louisiana, assisted Price in answering the scores of questions that came up during the open discussion, and pointed out that several million pounds of black are held in storage in Louisiana because of the overstocked market and slump in prices.

Washington, D. C. — United States shipping board has awarded contract to Standard Oil Company (New Jersey) for supplying fuel oil at the rate of 1,065,000 barrels a month during 1924.

Frank Haskell, president of the Tidal Oil and Tidal Refining Company, subsidiaries of the Tide Water Oil Company, has departed from his New York headquarters for an inspection trip through the oil country.

Uses and Limitations of Charcoal Process

Method offers greatest advantages when used with under-designed oil absorption plant

By G. G. Oberfell and R. C. Alden *

THE USE of solid absorbents, and in particular the use of highly activated charcoal has been practiced for the recovery of gasoline from natural gas since the close of the World War. The ability of charcoal to absorb[1] gasoline vapors from natural gas has been made familiar to practically every plant operator by the extensive use of the charcoal testing method.

C. L. Voress[2] has been associated with the work on the process since its incipiency, and has for the greater part of the time had direct charge of its development. Especial credit is due him and other officials and employes of the Gasoline Recovery Corporation for their faith and untiring efforts in the development of a method from laboratory scale experiments to a commercial process which today is represented by approximately a score of successful plants.

General Features

The general features of a charcoal plant do not differ materially from those of an oil absortion plant. Briefly in this application, natural gas is passed through containers holding activated cocoanut shell charcoal. After the charcoal has reached the desired saturation with gasoline vapors, the gas is turned from the vessel containing the saturated charcoal into another absorber while steam is passed through the saturated charcoal. The water and gasoline vapors resulting from this steam distillation are passed through condensing coils where the water and gasoline vapors are liquified and separated.

The general scheme of operation consists in having three absorbers or three groups of absorbers. In the cycle of operation one of the absorbers is in the stage of absorption, one in the stage of distillation and one in the stage of cooling, the cooling of the charcoal being effected by the residue gas from the absorber, into which the untreated gas is entering. This cycle is repeated at generally one to two hour intervals. This in a few words is the charcoal process. In view of what you have already heard or read concerning the principles involved in the design and operation of charcoal process plants it it not believed that a further discussion of the subject will be justified. However, there seems to be quite a diversity of opinion regarding the uses and limitations of the process. In this connection the writers are indeed glad to have this opportunity of voicing their opinions before an assembly of men vitally interested in the development of the natural gasoline industry.

Charcoal

The charcoal used for gasoline extraction purposes at present is made almost exclusively from cocoanut shells. The shells are first submitted to dry distillation in closed retorts. Part of the volatile matter is driven off by this means. The ordinary or inactive charcoal produced by this stage of the process is then subjected to steam treatment at about 850°C. in a special furnace. This treatment removes organic material from the charcoal. The degree of activation depends upon the efficacy of this treatment. During the World War a testing method was developed for grading charcoals with respect to their absorption values. This testing method consisted in passing a mixture of chlorpicrin vapor and air through the charcoal under specified test condition and in determining the length of time, as expressed in minutes, that a given amount of charcoal would completely remove the chlorpicrin vapor. Hence the expression "40 minute" or "50 minute" charcoal. Chlorpicrin was a poison gas used in warfare, and the degree of protection offered against this gas was considered a measure of the absorption value of the charcoal. At the close of the war carbon tetrachloride was proposed as a substitute for chlorpicrin, and the carbon tetrachloride method is sometimes used instead of the chlorpicrin test method.

The accompanying article was read to the members of the Association of Natural Gasoline Manufacturers attending the fall meeting held in Fort Worth and was received with great interest. The authors of the paper are recognized authorities on the subject and have given some observations that will prove of real interest to those engaged in the Natural Gasoline Manufacturing business. — The Editor.

Charcoal Supply

One of the arguments against the probable success of the charcoal process was that the supply of charcoal in such event would be unable to fill the demand. Statistics indicate that such is not the case. One year's supply of cocoanut shells alone would probably be sufficient to supply the demand for enough charcoal to produce over 1,000,000 gallons of charcoal gasoline daily. This is equivalent to approximately 50 per cent of the production of natural gasoline within the states. It is highly improbable that the charcoal process will ever be responsible for more than one-half of our natural gasoline production.

The manufacturing costs of charcoal remain very high. Cocoanut shells have been quoted at $6 per ton. Approximately 12 per cent of the raw material is converted into charcoal suitable for recovery purposes. With activated charcoal selling at 50 cents per pound, this means that the manufacturing costs are such that approximately $50 worth of raw material is converted into $1000 worth of the finished product. It would appear that manufacturing costs could be considerably reduced by improvements in the process of manufacturing, by the use of material of wider range in mesh in the gasoline industry, by disposal of the finest mesh charcoal in other industries and by the possibilities for the extensive use of by-products obtained from the volatile constituents driven off by the dry distillation of the cocoanut shells. In this connection it has been stated that Prof. Victor Lehner[3] of the University of Wisconsin, has successfully activated charcoal by treating the inactive charcoal with selenium oxychloride at moderately low temperature. Ray[4] concludes that selenium oxychloride does not produce charcoal of as good quality as that manufactured by high temperature, steam treatment.

Direct Comparison

A consideration of factors affecting plant production makes it plainly evident that any data regarding direct comparisons between production of different extraction processes are subject to so many variables that it is well nigh impossible to have experimental conditions fixed so as to draw definite conclusions therefrom. In submitting these meager data regarding direct comparisons it is realized that the information is only applicable in a general way. It can be safely stated, however, that practically all the data available, as well as theoretical considerations, indicate a much higher extraction efficiency for a charcoal process plant than any other process employed to date.

Some of the data reported to the writers regarding direct comparisons between charcoal process plant production and oil absorption plant production follow:

A miniature charcoal process plant treating gas from the main line leading to an oil absorption plant showed a yield of .203 G. P. M. of 62°Be. product without the use of naphtha blending. The oil absorption plant using 15 per cent naphtha produced a yield of 0.140 G. P. M. with a gravity of about 82°Be. for the blended product. The natural gasoline in the blend would have had a gravity above 90°Be. Experimental data indicated that the .203 G. P. M. yield of the charcoal process represented a more stable product than the 0.140 G. P. M. yield of the oil absorption plant. The percentage increase in production of charcoal process over oil absorption process in such case would have been 45 per cent.

A small charcoal process plant was installed on the same gas line with an oil absorption plant. The oil absorption plant and charcoal process

*Copyrighted.

[1] Properly referred to as absorption.

[2] General manager of the Gasoline Recovery Corporation.

[3] U. S. patent No. 1423231 by V. Lehner and F. M. Daisey.

[4] Chem. and Met. June 4, 1923, pp. 977-982.

A view of the carbon black plant being erected by the Texas Carbon Industries, Inc., to burn residue gas from natural gasoline plants in units, consisting of a burning capacity for about 12,000,000 cubic feet of

plant were operated on alternate days, or other alternate periods of time. The oil absorption plant produced 500 to 600 gallons of gasoline daily, whereas the charcoal process plant produced 800 to 900 gallons daily. The charcoal absorption gasoline was reported to be more stable than the oil absorption gasoline. The increase in production in this case would have been approximately 50 per cent.

A miniature charcoal plant was installed on casinghead gas at a compression plant. The compression plant used hot blending with naphtha producing a 70 per cent naphtha blend. The compression plant showed a yield of 1.80 G. P .M. The miniature charcoal process plant showed a yield of 2.68 G. P. M. of 84.5°Be. product. In addition the miniature charcoal process plant was able to extract 0.81 G. P. M. of 90°Be. gasoline from the residue gas of the compression plant. In this case the increase in production attributable to the charcoal process was 49 per cent.

One company has installed charcoal process plants on the residue gas from their oil absorption plants. It has been reported that 45 per cent increase has resulted since installing the charcoal plants.[5]

One charcoal plant is treating gas from a locality that oil absorption plants are extracting about 500 gallons of gasoline from each million cubic feet of gas. The charcoal process plant produces in excess of 750 gallons of gasoline per million cubic feet of gas. Tests on the gas indicate that gases to the various plants have about the same gasoline content. If such is the case the increase in yield attributable to the charcoal process would be about 50 per cent.

Gasoline Recovery

Summing up the data presented above it would appear that charcoal process plants are capable of producing approximately 50 per cent more gasoline than plants operating under other processes. The writers do not believe that on the average such an increase could be expected. It seems reasonable to assume though that for gases having a gasoline content less than 1.00 G. P. M. that a charcoal process plant will produce 25 per cent more gasoline than that produced at present by the average oil absorption plant. It is possible to so design and operate an oil absorption plant so as to obtain a production more nearly approaching that of charcoal process plant practice, but apparently the economical balance does not justify such an installation. It is also realized that the last step has not as yet been made in the ultimate improvements of the oil absorption process. In all fairness to the charcoal process it would appear that its chances for improvement are at least equal to those of the oil absorption process.

Charcoal Testing Method

Perhaps the most satisfactory way of judging the performance of the charcoal process is to compare its actual accomplishments based on the charcoal tests of the inlet gas with actual accomplishment based on the inlet charcoal tests of gas at plants using other extraction methods. Table No. 1 presents figures which will permit such a comparison.

Comparison by testing methods can be justly criticised on the grounds that any test result is subject to a large number of variables, and therefore the test result may not afford a good indication of the gasoline content of the gas. It is believed that the large number of comparisons which have been made between plant production and charcoal test results removes beyond all reasonable doubt the validity of comparisons between charcoal test results and plant production providing due allowance is made for quantity of product shipped. Scores of oil absorption and compression plants have been investigated and plant production compared with charcoal test results under variable conditions. Thousands of charcoal tests have been made in establishing these comparisons. The charcoal testing method has been subjected to a most rigid examination with the results that test yields have been gradually increased. The comparisons, therefore, favor the oil absorption plants since some of the comparisons represent relation between the charcoal testing method prior to some of its improvements. However, the specifications for products shipped from the plants in several cases has favored the charcoal process plants.

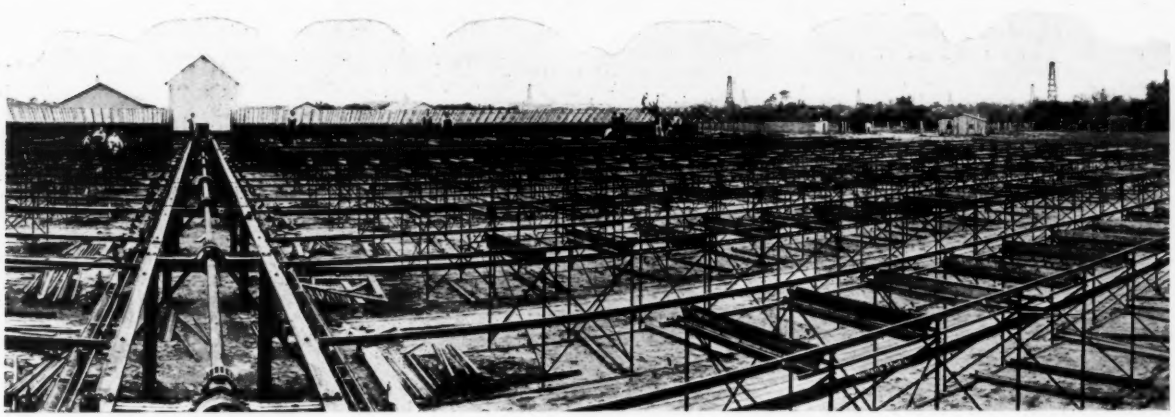
The average plant yield—test ratio for extraction processes, other than the charcoal absorption process, was 0.99, while the plant yield—test yield ratio for the charcoal process was 1.54. In other words, on the average, the charcoal process has exceeded the test on the inlet gas by 55 per cent more than other extraction processes.

No doubt the figure of 55 per cent is high. One would not be justified in expecting a charcoal process plant to yield 55 per cent more than that predicted by a charcoal test of a representative sample of the gas being treated. At least, one would not expect such an increase, unless most lenient shipping specifications were had for the plant's product. The high ratios, in case of the charcoal plants, are attributable to lenient shipping specifications which were probably responsible for an increase in sales of about 25 per cent more than would be obtained for ordinary shipping specifications. In this connection it might be stated that the charcoal plant designated by No. 15 in Table No. 1 shows a plant yield-test yield ratio of 1.92. The oil absorption plant designated by No. 6 in this table during the same period was showing a ratio of 1.03. Both these plants were carefully investigated by the writers. The oil absorption plant was shipping 50 per cent of its production under Grade "A" absorption gasoline specifications and the remaining 50 per cent was blended with about 25 to 30 per cent of New Navy gasoline. This blend was shipped to the same destination, and under exactly the same specifications as that obtaining for the charcoal process plant. This oil absorption plant is recognized as being above the average in gasoline extraction efficiency. The oil absorption sales could have been increased approximately 20 per cent if all the product had been shipped under the more lenient shipping specifications. In this comparison, the charcoal process plant exceeds by 50 per cent the expected production for the oil absorption plant under the most lenient shipping specifications possible within the I. C. C. regulations.

Installation Costs

The same factors affecting the costs encountered in the installation of an oil absorption plant also apply to the charcoal process plants. However, the weight that these factors have, in determining costs, differ greatly for the two processes. As is greatly recognized, the pressure and volume of gas treated are of paramount importance in arriving at the costs of installing oil absorption plants. The amount of gasoline to be produced is the major item in the installation costs of charcoal process plants. Such being the case, it naturally follows, that, if the char-

[5]Proceedings of second annual convention of the Association of Natural Gasoline Manufacturers.



Stephens County section of West Texas. The photo shows a completed unit in the background, with framework up for the remaining two gas daily. The completed houses at this plant were fired up November 1 —Photo by Walton, Breckenridge, Texas

coal process has a place in the gasoline industry, the economical balance between cost and production would favor the charcoal process for lean gas, low pressure and small production.

Based on a 1000 gallon production, for which one plant was designed, the installation cost was $25.75 per gallon. Based on actual production, charcoal process plants have been installed for costs averaging about $15 to $20 per gallon (1922-23). This cost does not include gas gathering lines and compression machinery. Since the latter item represents an amount almost equal to the other costs, it appears that a charcoal process plant and an oil absorption plant would have about the same installation costs for gas containing about 1.0 G. P. M. at an absorption pressure of about 30 to 50 pounds gauge. Naturally, larger plants can be built for a lower price per gallon than smaller plants. The installation cost decrease is not proportionately as great for charcoal process plants as for oil absorption plants. The equipment and material used in a charcoal plant, as compared with those used in an absorption plant, do not favor as great a reduction in installation costs, attributable to increased plant capacities. In this connection, it might be stated that the cost of charcoal alone amounts to about $5 per gallon of plant design capacity.

Manufacturing Costs

Conditions favor the following items, for lower manufacturing costs for charcoal plant than for an oil absorption plant of equal capacity. Superintendence and labor; maintenance and general supplies; testing, teaming, trucking and automobile expense, and general overhead expense. The reason for this is that the charcoal process plants have less moving parts, and because the duties required on the part of the operators are fewer and more easily mastered.

Exclusive of gas royalties and process royalty, the following estimates are presented for the manufacturing costs of charcoal process plants, installed and operated under the following assumed conditions:

Plant 1: Municipal gas treatment. Neither compression machinery nor gas gathering lines required for installation. Plant located on main gas line, near railroad and water supply. Installation cost $80,000. Plant production 4000 gallons daily.

Plant 2: Casinghead gas treatment. Compression machinery and field lines included in installation of plant. Plant located favorably as regards to gas and water supply and distance from a railroad. Installation cost $150,000. Production 4000 gallons daily.

Plant 3: Installed on residue gas of large oil absorption plant. Installation cost $70,000, included only absorption, distillation and cooling elements. The remainder of equipment used in common with the oil absorption plant. Production 4000 gallons daily. It is assumed that fuel is free and that no extra labor is required for the operation of the charcoal plant.

For comparative purposes the estimated costs to manufacture gasoline at the average oil absorption plant in the Mid-Continent field is also included in the table.

It is plainly evident that the charcoal process offers possibilities of profits that gasoline manufacturers cannot much longer afford to ignore. A charcoal process plant installed on the residue gas of a very large oil absorption plant can be made to show phenomenally high profits. This is due to the low installation and manufacturing costs made possible by the existing oil absorption plant.

Table No. 3 was prepared with the intention of showing the amount of process royalty that could be paid and allow the natural gasoline manufacturer to make 50 per cent on his investment for plant No. 3, Table No. 2.

In this estimate, a royalty of 25 per cent is allowed the seller of the gas. Table No. 4 shows the profit that would be obtained by the natural gasoline manufacturer when paying a process royalty of 10 per cent.

Uses and Limitations

It has been only a few years since the charcoal process was generally looked upon with skepticism. It is now recognized by the majority of operators and technologists that the charcoal process is both a technical and an economic success since its applicability

Three Carbon Black Plants Operating From Residue Gas in Stephens County

Breckenridge, Texas.—Operating under a permit granted by the oil and gas division of the Railroad Commission for a period of five years, the first three carbon black plants to be allowed in Texas have started manufacturing carbon black from residue gas obtained from natural gasoline plants in Stephens County. These plants represent a combined investment of approximately $1,000,000, and when all units are completed will burn 30,000,000 cubic feet of gas daily. A number of additional applications have been filed with the Commission for permits to erect plants in the Panhandle gas field, and in Eastland, Stephens and Refugio Counties, but no definite action has been taken on granting the permits.

The first unit of the Texas Carbon Industries, Inc.'s $400,000 plant on the W. H. Ackers lease, north of Breckenridge, was fired up November 1, and consists of 30 burning houses, with a combined capacity of 4,000,000 cubic feet of gas daily. When completed about the first of the year this plant will have 90 burning houses. The plant of the Coltexo Corporation, which is owned jointly by The Texas Company and the Columbian Carbon Company, on the J. W. Parks lease five miles south of Breckenridge started operation of its first unit last July, and has since fired up an additional unit. This plant is to have 90 burning houses, with a combined daily capacity of 10,000,000 cubic feet of gas, and will cost $350,000 when completed. The Magnolia Petroleum Company is operating the first units of its 8,000,000 cubic foot daily capacity carbon black plant, located on the Jesse R. Smith lease southeast of Breckenridge, and will probably be running full capacity by the first of the year. This plant will cost $250,000, and will have a total of 60 burning houses.

Name of Company, Address, Location of Plant	Burning Houses	Daily Capacity in Cubic Feet	Approximate Cost
Coltexo Corporation, Breckenridge, J. W. Parks, T. L. & E. Co. Sur.,	90	10,000,000	$350,000
Magnolia Pet. Company, Dallas, J. R. Smith, NE¼ Sec. 21, L. A. L.	60	8,000,000	250,000
Texas Carbon Industries, Inc., Breckenridge, W. H. Ackers, NE¼ Sec. 2, L. L. A.	90	12,000,000	400,000

under particular conditions is a matter of accredited performance. As was the case of the oil absorption process during the earlier stage of development, a certain amount of prejudice will have to be overcome before the process receives the consideration due it, and is thereby enabled to be of greater usefulness to the natural gasoline plant operators. The charcoal process is by no means a solution for all gasoline extraction problems. Its uses and limitations are manifested by the following list of its advantages and disadvantages:

1. Cost of installation is based mainly on number of gallons of production and not on actual volume of gas handled as in case of oil absorption plants.

2. Charcoal plant yield is generally higher than the test yield, thereby reducing average installation and operation costs and increasing gross income.

3. Charcoal plant efficiency is much greater than efficiency of other methods.

4. Charcoal process gasoline is better than gasoline produced by other processes per se and presents the possibility of preparing products for high priced petroleum fractions.

5. The charcoal process plant has not the moving parts, nor the high pressures, nor the high temperatures that other extraction processes require. Replacement and maintenance would therefore not be high for a charcoal plant as for other plants.

6. A charcoal plant is practically portable. It can be easily moved from one part of a field to another. It seems to the writers to embody the principle of the portable plant for which operators have long sought. It also seems to the writers to present an ideal method of entering a new field, ideal because of its portability. It provides a means of holding and obtaining gas options, feeling out new fields and incidentally producing gasoline at a profit.

7. Simplicity of operation is another advantage the charcoal process has. There is practically no chance of producing either high end point, or off color gasoline. The operators' duties are simple, few and easily mastered.

8. Cleanliness is a minor advantage.

9. The further elimination of fire and explosion hazards is another advantage of the charcoal process. There is not the pressure hazard encountered in the compression process nor is there the first hazard encountered in oil absorption plants.

10. The slight amount of coil cooling water required in the charcoal process is a decided advantage. The greater part of the coil water in a charcoal plant is actually used to condense gasoline vapors. There is no oil to cool, there is no gas to cool, unless the residue gas is returned to city mains or to lease lines. The water requirements of a charcoal gasoline plant are much less than they would be for an oil plant of the same size.

11. Fuel consumption favors the charcoal process plants wherever its installation is justified by other factors.

12. Pressure considerations do not within practical limits affect operating conditions at a charcoal plant. Therefore, a charcoal plant could operate longer on well pressure gas than could other processes, in which definite pressures must be maintained.

13. The high cost of charcoal is a disadvantage of the process. This item is the greatest single element in the cost of plants. It would seem probable that this high cost could and should be reduced.

14. Process royalty is a disadvantage with which the success of any process is handicapped. Operators are loathe to receive any cost item regardless of its magnitude when it is clothed in the raiment of process royalty.

15. Another disadvantage at present inherent in the process is that installation cost decrease attendant to increased plant capacities are not proportionately as great as that for the oil absorption process.

Possible Applications

As the charcoal process stands today there are five possible applications. These are: (a) municipal gas, (b) lean gas which can be economically contracted for, (c) combination processes in future installations, (d) portable plant for exploiting new fields, (e) residue gases from existing plants. The possibilities in these applications will be discussed in order.

Municipal Gas

The application of the charcoal process to municipal gas has proven its advantages in its successful and profitable operation at several places. This is a field in which no other process can compete with the charcoal process. There are difficulties in this application occasioned entirely by fluctuations so that wherever it would be at all profitable to treat city gas, the charcoal process or a combination process would be the best method.

Lean Gas

This is another field in which the charcoal process has advantages over the other methods of gasoline extraction. A charcoal plant will function regardless of pressure so that with a charcoal plant, well pressure can be taken advantage of for a longer period. The efficiency of the charcoal process is another advantage it has over other methods. It seems to be true that the leaner the gas treated by oil absorption, the lower the efficiency of gasoline extraction. The comparatively small volume of cooling coil water required is another factor in favor of this application of the charcoal process. In come localities the available cooling water will not suffice for the requirements of an efficient oil absorption plant. The fact that the fundamental elements of a charcoal plant are designed according to gallons of production and not for the volume of gas handled is another one recommending the application of the charcoal process to lean gas.

Combination Process

It is in this field that the charcoal process offers the greatest advantages for the future. It is possible to build a fairly efficient oil absorption plant very cheaply. A combination of an under designed oil absorption plant with a charcoal plant would be a very economical installation for treating large volumes of gas. Such an installation has much to recommend it besides the major consideration of low initial cost. A better grade of gasoline would be produced, less cooling water would be required, there would be a less cost of upkeep and maintenance, and it would probably attain a higher efficiency of gasoline extraction.

Portable Plant

The possibilities of the charcoal process in this direction, are obvious at a glance. The heaviest element in a charcoal plant proper is the boiler. It is simple oil engineering to transport a boiler. The absorbers, miscelleanous tanks, coils and lines are few and small.

Residue Gases

The application of the charcoal process to residue gases of existing plants has been proven by its sucessful application in several instances. If an experienced gasoline operator sees advantage in this applcation of the charcoal process in Pennsylvania where cooling water is abundant, it is reasonable that operators in the mid-continent and western fields could find advantage in its use.

In this connection, it might be stated that it has been found that charcoal at plants treating residue gas from oil plants has been known to gradually lose its absorption power, due to clogging of the capillaries of the charcoal by oil. This experience has not been encountered at other charcoal process plants. Whether the oil is carried over mechanical as a mist or whether it is carried over as a true vapor, has not to the writers' knowledge been definitely proven. This operating difficulty has not proven to be a serious one. The charcoal is readily cleansed of the absorbed oil by means of superheated steam whenever the occasion demands. If the oil is carried over mechanically, the difficulty ought to be readily overcome by means of gas and oil separators, the design of which ought not to be a serious problem. If carried over as a true vapor, then a small charge of charcoal ahead of the main absorbers should suffice to remove large quantities of oil from the gas. It has been suggested that the oil could be removed by washing the charcoal with gasoline, and then removing the gasoline by distillation.

To the writers' knowledge, only one operator has experienced trouble with oil in charcoal. As a proof that this operator considered the disadvantage a minor one, is evidenced by the fact that two more charcoal plants were designed to treat residue gas from oil plants after encountering this problem.

Several large operators are losing opportunities of profits ranging from 75 to 150% annually that could be made by installing charcoal process plants on the residue gas of their oil absorption plants. It is estimated by the writers that there is being wasted annually in this country more than 75,000,000 gallons of gasoline which is lost in the residue gas of existing gasoline plants. It is believed that economy would justify installation of charcoal plants to remove 70% of this otherwise wasted gasoline. At 14 cents per gallon, the value of this gasoline is in excess of $10,000,000.00. This gasoline could be removed by charcoal process plants by an expenditure of about $4,000,000. In Stephens County, Texas,

(Continued on page 21)

Pipe Stills Aid Output of Skimming Plants

A discussion of this installation as compared with cylindrical stills

By F. N. Williams

CRUDES, gas oil, treated crude, asphaltic oils, slop oils, steam still bottoms, and various refinery odds and ends, are split up into their different grades and reduced to residues of previously determined character. The crudes are stripped of gasoline, kerosene or more products if desired, the residue being pumped out as fuel or given further treatment for other grades; the treated crude stripped and made ready for reduction for cylinder stocks; asphaltic oils made ready for reduction to asphalt or road oils; and steam still bottoms split up into two or three merchantable products.

In considering continuous distillation in cylindrical stills the number of stills required in a set depends upon the amount of distillate to be removed, and the amount of distillate boiling within a certain range, since an oil containing a very large fraction distilling between a fairly close range would produce such a large amount of distillate in a short space of time, one still would be inadequate to handle it, possibly two or three stills would be required.

Without Towers

For example, steam still bottoms from gasoline distillate, which will usually contain very little naphtha, will in most cases yield large quantities of kerosene of mediocre quality, too large a yield, in fact for one or two stills to take care of, hence the necessity of two or more stills for this purpose. A typical example would be a three still set, the first running heavy naphtha, the second and third running kerosene and the bottom being pumped out as gas oil.

The trouble here as is the case with distillate from flat stills or stills not equiped with towers (vapor separators) is that the kerosene thus produced requires a large amount of acid in treatment, about 12 pounds per barrel, and usually the kerosene when tested in a lamp gives a poor burning test due to heavier fractions being carried over during distillation.

Batch Distillation

As the heating area of a horizontal still is 1.0472 d 1 assuming that one-third of the shell is fired, it is obvious that continuous stills have a greater capacity due to a larger firing area on account of the higher minimum oil level. This is only one of the many reasons for the greater capacity and advantages of continuously operated stills over the batch type. The capacity of continuous stills may be rated at 1.5 d 1 per day, and the capacity of batch stills, removing the gasoline content only may be approximated at one barrel per day per square foot of still bottom area, subject to increase or decrease according to the intensity of firing and the character of the crude.

Other important points in favor of continuously operated stills are, (A) Batch stills and their settings are subject to cooling at the end of each run while the residual oil is being pumped out and while the stills are being charged with fresh oil entailing a dead loss of fuel oil used in bringing the stills and contents which are fairly cool, back to the temperature of distillation. (B) Deterioration of still bottoms, brick work, setting, etc., due to frequent heating and cooling. (C) Loss of time used in pumping out residual oil and recharging fresh oil also time required to heat fresh oil to boiling point, all of which, in the case of an average size still, amounts to about six or seven hours. (D) Loss of heat from hot residual oil which is being pumped through a cooler to storage in the case of batch operation, which heat is utilized in continuous operation, by means of heat exchangers, to heat the ingoing fresh oil to within 10 to 20 degrees Fahr. of the residue.

It is good practice to lead the hot residue from the last still in a continuous set, through a coil in the first still and then out through the heat exchanger, enough heat being derived from the hot residue in the coil to take care of the operation of the first still with the possible addition of a very small fire and provided that the oil being run contains material of low boiling point.

Spraying the fresh feed into the first still helps a great deal in releasing the lighter products.

The fuel consumption of a continuous set up, average stripping, may be figured at about 4% of the in-put while batch stills will use from 5% to 6% of their charge, in each case assuming a first class set-up. These figures vary with the character of oil run and the percentage stripped.

Towers

All stills operating on the above mentioned oils should be equipped with towers or vapor separators, in order that each overhead product will be homogeneous. Without the use of towers there is too much overlapping of boiling points in the distillates caused by the mechanical carrying over of heavier products, even in careful firing, and this fault is greatly exaggerated by too rapid firing.

Stills equipped with one or more towers will produce distillates of good color and even boiling curves, due to the fact that the vapors are properly separated in the towers, the heavier portions are returned to the stills or led off through a separate condenser line. In running crude the percentage of light products may be somewhat increased by the aid of cracking the condensate in the towers by returning same to the next still in line, which, being hotter, tends to partially crack the cool oil led into it. This may be carried out in two or three stills, for example: Condensate from tower or towers of No. 2 still reflux to No. 3 still, condensate from towers of No. 3 still reflux to No. 4 still, etc.

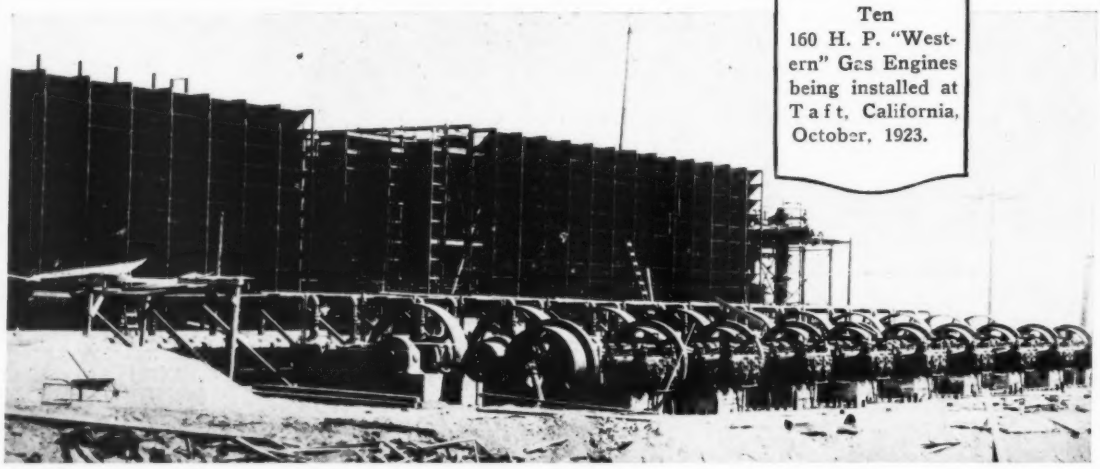
Pipe Stills

The ideal installation for the skimming plant or refineries having oils to be stripped, reduced or topped is the pipe still, on account of its large capacity, low fuel consumption, continuous operation, ease of control, good fuel combustion, uniform distribution of heat over all parts of the heating surface, ample heating surface, eliminating overheating certain sections, positive oil circulation, unlimited design, and general ease of operation.

One of the best examples of this type of still is the Foster heater, in which all the best features of pipe still construction are incorporated. The results obtained by refiners with this still are more than satisfactory. For example, Mexican crude run through the Foster on a 2238-hour run gave the following results:

Crude run, Mexican—234,999 barrels.
Gravity Be. 20.6@60 F.
Viscosity Saybolt @ 100 F. 603 seconds.
B. S. & W. .1 per cent.

Roof Tubes and Supports



Ten 160 H. P. "Western" Gas Engines being installed at Taft, California, October, 1923.

SOME OF THE REASONS WHY MANY COMPANIES ARE STANDARDIZING ON— "WESTERN" ENGINES

Throughout the petroleum industry new names are being added almost daily to the already large list of companies standardizing on "Western" Engines for their power needs.

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"Western" Duplex Gas Engines in service during a period of five years, in constant operation, which show records of maintenance costs as low as $72.00 per unit per year, is another reason.

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Average rise in heater 316 F.
Distillate rerun to 56.2 Be. 85 per cent.
Distillate rerun to navy specifications 17 per cent.
B. U. per lb. crude 180.
Fuel burned (residuum) 3,036.07 bbls.
Gravity of residuum 15.2 Be.
Flash (closed cup) 170 F.
Fuel efficiency 70.5 per cent.
Fuel in per cent of through put 1.29 per cent.
Fuel per bbl. run .542 gals.

Topping California Crude

Crude run, California:
Gravity of crude, 29.0 Be.
Capacity, barrels per 24 hours, 3900.
Distillate per cent, 43.
Temperature oil entering heater, 205 F.
Temperature oil leaving heater, 569 F.
Temperature rise in heater, 364 F.
Temperature flue gas, 473 F.
CO_2 in flue gas, 8.5 per cent.
Fuel bbls. per day, 67.
Fuel per cent through put, 1.7.
Fuel efficiency, per cent, 74.

An interesting record follows, in which a Foster heater is used to utilize the waste heat from a battery of ten cylindrical stills.

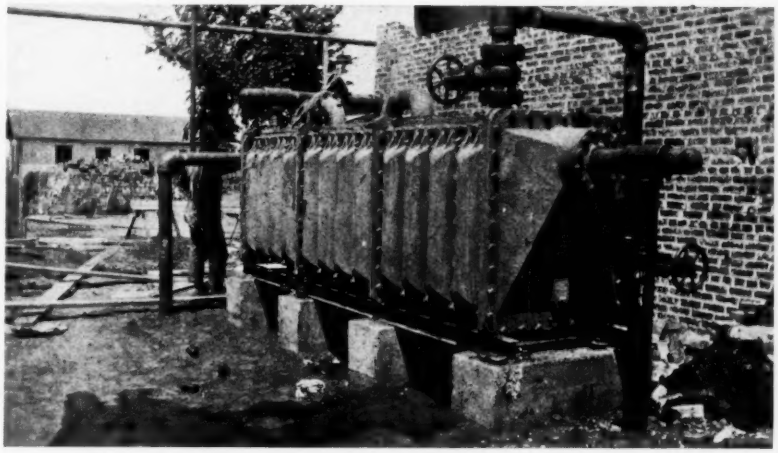
Crude run, Mid-Continent:
Gravity of crude, 33.7 Be.
Capacity, bbls. per 24 hours, 3,900.
Temperature crude entering heater, 44 F.
Temperature crude leaving heater, 226 F.
Temperature rise through heater, 182 F.
Temperature flue gas entering heater, 988 F.
Temperature flue gas leaving heater, 662 F.
Oil pressure entering heater, lbs. per sq. in., 91.
Oil pressure leaving heater, lbs. per sq. in., 37.5.
Different draft in flue before and after heater, .3".

Used as Stripping Still

Capacity barrels per hour, 65.
Capacity barrels per day, 1560.
Distillate per cent of charge, 85 per cent.
Distillate gravity, 32.0 Be.
Residuum, per cent of charge, 15 per cent.
Residuum gravity, 10.0 Be.
Temperature oil entering heater, 160 F.
Temperature oil leaving heater, 800 F.
Temperature rise in heater, 640 F.
Friction through heater, lbs. per sq. in., 60.
Fuel consumption, cu. ft. gas per hour, 10,250.
Fuel consumption, cu. ft. gas per bbl. through, 157.

Topping Mexican Crude

Gravity of crude, 20.4 Be.
Capacity per 24 hours, bbls., 7,306.
Distillate, per cent, 20 per cent.
Distillate gravity, 56.0 Be.
Residuum gravity, 14.0 Be.
Temperature oil entering heater, 150 F.



An installation of a Southwestern Heat Exchanger

Temperature oil leaving heater, 424 F.
Temperature rise in heater, 274 F.
Oil pressure heater inlet, lbs. per sq. in., 66.
Oil pressure heater outlet, lbs. per sq. in., 12.
Fuel burned per hour, actual weight in lbs., 1,178.25.
Efficiency, 74.3 per cent.
Fuel in percentage oil charged, 1.19.
Fuel per barrel run, gals., .49.
Flue gas temperature, 516 F.

In the above test the heater was designed for 6000 barrels per day of 24 hours, and was therefore running considerably above capacity.

These stills may be used successfully for topping and cracking, also for utilizing the waste heat from other types of stills and under the same general design may be used as preheaters in lubricating oil distillation.

Among the many features incorporated in the design may be mentioned the reduction of the diameter of the tubes in closest contact with the hottest part of the furnace which increases the velocity of the oil and prevents coking and overheating of that portion of the tubes which so often cause trouble in ordinary installations of this type. The trouble and loss of heat sometimes met with by improper construction of the roof arch is overcome by having the roof supported on four inch tubes incased in fire brick blocks or C tile, the tubes are supported from I beams outside the fire zone, by means of bolts which at one end are welded to the tubes.

The oil entering the still passes first through these four inch tubes carrying off sufficient heat to prevent overheating the brick work of the roof. The main heating area is arranged in a chamber at the rear of the furnace and consists of banks of superimposed four inch Foster elements weighing 45 pounds per foot, and serving to smooth out or control sudden temperature changes which might otherwise crack the oil. The Foster elements are cast iron sleeves into which cold drawn seamless steel tubes are expended, making a close metal to metal contact. The outside surface due to the corrugated cast iron sleeves, has a heating surface per lineal foot four times that of a plain tube. Oil passing through the tubes at high velocity absorbs heat from the tube much more rapidly than the tube, even with the extended outside surface, can absorb heat from the surrounding hot gases.

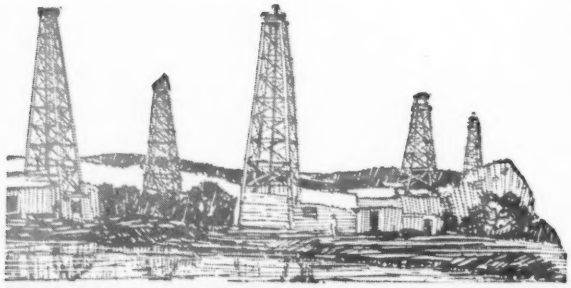
The heat absorbed is therefore controlled by the ability of the tubes to extract heat from the gases, making the extended outside surface usable to the fullest extent.

The tube ends which terminate in steel headers are protected from actual contact with the hot gases by cast tube supports. The headers are easily examined by opening the large inspection doors placed at each end of the tube banks, rendering cleaning of tubes a very easy matter. Should any leaks occur in the plugs or in the tubes due to allowing the tubes to plug up, the leaks and resulting fire is confined to the small area between the cast iron sleeves and does not spray out as sometimes is the case with plain tubes.

The writer has observed in actual practice with the Foster heater that coking troubles may be avoided by inspecting the tubes at regular intervals. This is done without any interruption of operation, by means of the small tube inspection doors at the rear of the furnace and, it will be noticed that the upper rows of tubes, in the hottest zone will show overheating, due to deposit of coke, salt, sand, etc., first. These tubes, if coke, etc., has been deposited in dangerous quantities, will be a dull red, when it is good practice to shut down for cleaning.

In running oils which coke readily it has been observed that much time may be saved by running until the first signs of heating are noticed, and at this point circulating until the furnace is cooled to a temperature at which there is no danger of burning the tubes, then introducing steam through the tubes for about 30 minutes to an hour, again circulating and meanwhile lighting the fires and bringing the temperature up to the operating point, when the still will be again in active operation. The steam clears the carbon deposit if introduced in time before it has had time to adhere to the tubes. This process also removes sand, salt and other foreign material.

The heaters work better above their rated capacities, so that time need not be lost even should it be necessary to



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Cooling Systems and Gasoline Evaporation

Investigation made of various methods used to reduce the large annual loss

*By Ludwig Schmidt**

EACH year an enormous supply of gasoline accumulates over the winter months and is subject to losses by evaporation. On the basis of experiments made by the Bureau of Mines, it is estimated that three to four per cent of the gasoline stocks that accumulate between the end of the summer season and the following spring is lost by evaporation.

Several methods are now in general use for reducing these losses. This report presents the results of tests made by the Bureau of Mines on different kinds of cooling systems. The effect of water sprays, water seal roofs and insulation on tankage for reducing the evaporation losses of refined gasoline are discussed. It is not the purpose of this report to recommend any particular type of system. The selection of a suitable type of equipment for reducing evaporation losses rests with the individual refiner, for the costs of the construction and operation vary in different localities.

The consumption of gasoline in the United States varies materially with the seasons; during some of the summer months it exceeds the rate of production and in the other seasons the production of gasoline exceeds the consumption. The usual practice of the larger refiners is to store surplus stocks during the winter season in order to meet the heavy demands during the summer months.

The following table shows the stocks of gasoline at refineries on the last day of April for the past five years:

1919.....	593,616,170	gallons
1920.....	643,552,644	gallons
1921.....	747,222,900	gallons
1922.....	892,567,766	gallons
1923.....	1,336,417,871	gallons

Relation of Evaporation

Before discussing methods for preventing evaporation losses of gasoline in storage it is important to consider the effect of evaporation on the character of the gasoline. Gasoline is usually refined to meet certain specifications. The specification limits vary with the contracts under which the gasoline is sold, but certain specifications are designated by practically all buyers of refined gasoline. These are gravity in degrees A. P. I., initial boiling point, and end point in degrees Fahrenheit. Specifications defining the percentages of gasoline that must distill over between certain temperatures, and distillation curves are also coming into general use.

The different gasolines marketed, such as blends with natural gas gasoline, refined gasoline and gasoline from cracked distillates have been discussed in detail by Hill and Dean[1]. The losses by evaporation of these various gasolines in a given time differ according to the nature of the gasoline; however, the general effect of evaporation on the character of gasoline is much the same for all kinds.

Gasoline may be considered as a mixture of the lighter liquid hydrocarbons found in petroleum. The first fractions to evaporate are the most volatile; therefore they have the highest A.P.I. gravity and the lowest boiling point of any fractions of the gasoline. The escape of these light fractions from gasoline in storage results in a large financial loss to oil refiners, not only because of the reduction in volume, but mainly because the characteristics of the gasoline are changed. The greatest change is a raising of the initial boiling point and lowering of the gravity. The loss in gravity is not difficult to remedy. However, the addition of low-boiling constituents to lower the initial boiling point or to meet the requirements of the distillation curve is very costly. The loss by evaporation of a small percentage of a tank of gasoline will usually require a relatively large addition of light products. This is due to the fact that the portion evaporated consists of very low boiling hydrocarbons, while the light gasolines available for blending contain considerable proportions of higher boiling material. Blending is usually done at the time of shipment, and this may entail an additional loss to the refiner, as he must often make or buy on the market, low-boiling products at a time when prices are the highest. The aggregate losses to the refiner from evaporation of gasoline in storage, therefore, may be considerable and it is to the refiners' best interests to reduce evaporation losses to a minimum.

Reduction of Losses

The following are the four main factors that govern the rate of evaporation of a liquid: (a) Renewal of air over evaporating surface, (b) Temperature of the surface of the liquid, (c) Area of evaporating surface, and (d) Quantity of vapor in the surrounding atmosphere.

Regulation of any one of the above factors will affect the rate of evaporation. There are several methods now in use for decreasing the rate of evaporation by reducing the area of the evaporating surface, as for example, floating roofs or frothy mixtures to cover the surface of the liquid. These are not discussed here. This report deals with the control of the temperature of the surface of the liquid, and the renewal of air over the evaporating surface.

Renewal of Air

A prime requisite for the reduction of evaporation losses under present storage conditions is vapor-tight tankage. Vapor tight tankage will practically eliminate the renewal of air over the surface of the liquid in the tank, except as it may be caused by temperature changes and by emptying and filling a tank. A vapor tight tank prevents free circulation of air over the surface of the liquid.

In order to provide for the necessary release of pressure or vacuum during the filling and emptying of vapor tight tanks, each tank is equipped with proper pressure and vacuum relief valves. This prevents the tank roof from being ruptured by bulging during filling or pulled in during emptying; it also prevents any distortion or rupture to the tank roof due to expansion and contraction of the vapors in the tank caused by variations in atmospheric conditions.

"All steel" tankage such as that used by oil refiners is usually provided with roofs varying in thickness from about 9/64 to 3/16 inch, laid on steel rafters and attached only to the shell of the tank at the top angle or chime. With such construction it is advisable to set the pressure relief valve for a pressure not exceeding 1½ ounces and the vacuum relief valve for not more than one once vacuum on the heaviest tanks. It is essential that gauges and thief hatches, manholes and swing line hatches be vapor tight.

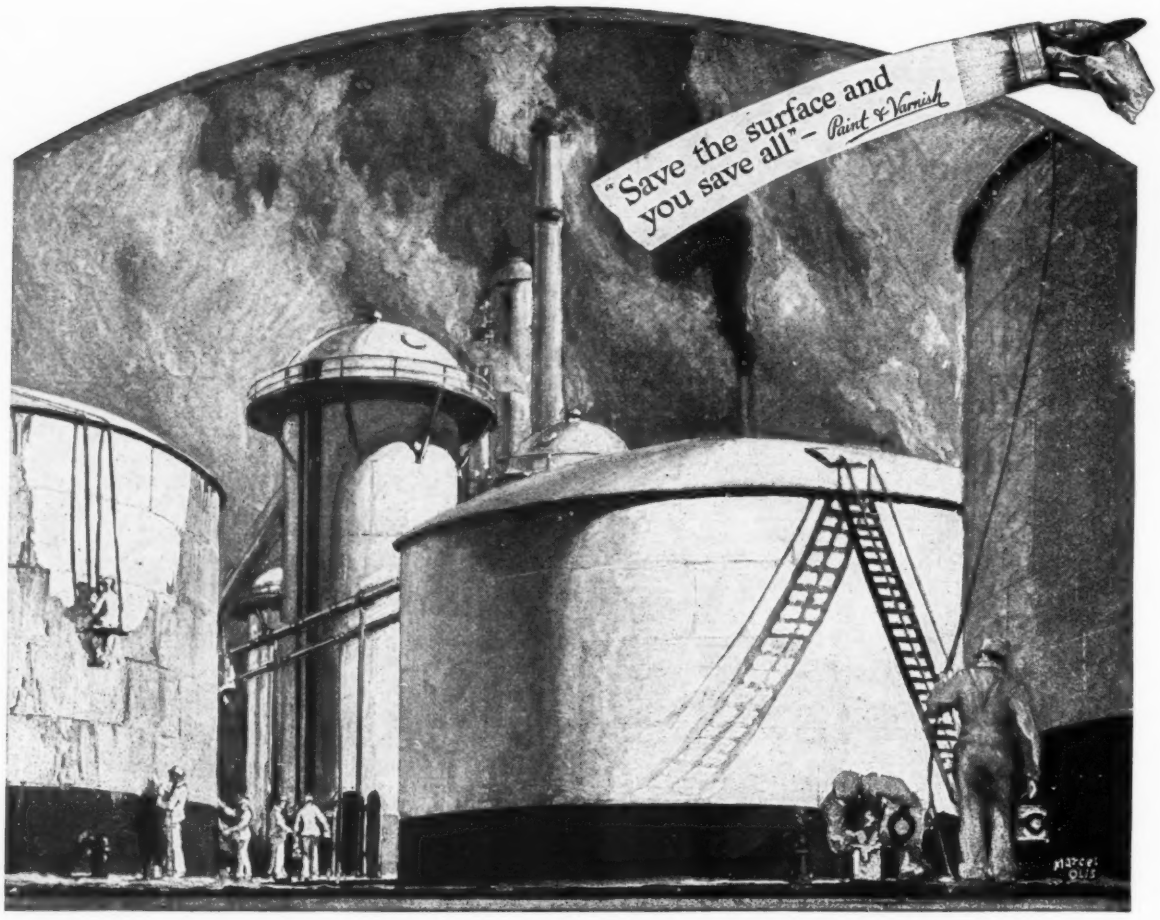
Many companies prefer to equip their tanks with breather lines and not use vacuum and pressure relief valves. This is satisfactory, as it prevents excess pressure or vacuum on the tank and carries the vapors outside of the fire wall. However, if the tank or breather line is equipped with a pressure and vacuum relief valve, enough pressure may be carried on the tank to enable the gauger to detact any leaks in the roof. Also, the valve will prevent diffusion through the breather line and practically prevent breathing caused by the frequent but minor atmospheric changes.

Breathing Losses

With vapor-tight equipment the renewal of air over the liquid surface in a tank is reduced to a minimum. It must be borne in mind that even with vapor-tight tanks and equipment, breathing losses are considerable. For example, if a 55,000-barrel tank which is 30 feet high, is filled to 29 feet with oil, the vapor space between the surface of the oil and the roof is about

[1]Hill, H. H., and Dean, E. W. Quality of Gasoline Marketed in the United States, Bureau of Mines Bulletin 191, 1921.

*Assistant Petroleum Engineer, Bureau of Mines, Department of the Interior.



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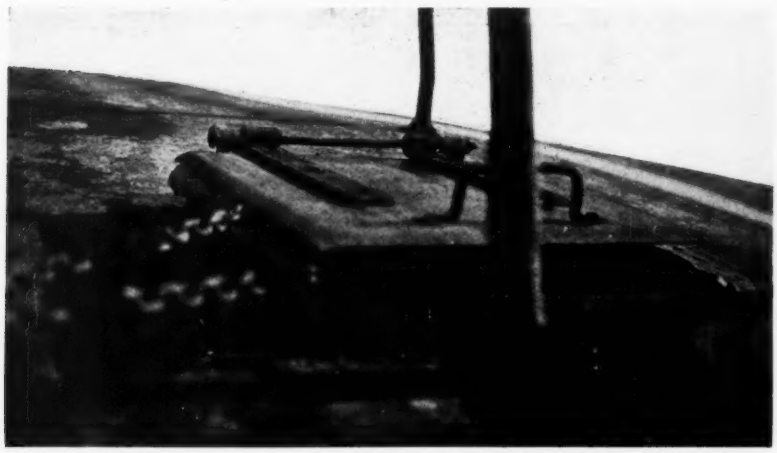

An example of careless practice. Gas tight tank with hatch partly open to allow passage of swing pipe chain.

34,330 cubic feet. If the temperature increased 40° F., 2800 cubic feet of gasoline-saturated air would be expelled. If the tank contained only 15 feet of liquid the amount of air and vapor expelled under the same conditions would be 14,500 cubic feet. The amount of saturation of the air with gasoline vapor depends upon the vapor pressure of the liquid at the temperature (surface temperature) of the liquid stored. During the hot summer months the vapor expelled from gasoline storage tanks often contain over 80 per cent gasoline vapors; also during the summer months the maximum and minimum temperature variation of the vapor in the tank is more than 70°F. in 24 hours. From a 55,000 barrel tank filled to 29 feet, the breathing loss caused by temperature change of 70°F. is 3700 cubic feet of saturated air or vapor. If this air carried 80 per cent gasoline vapors, the loss in gasoline, assuming 30 cubic feet of vapor per gallon, would be 97 gallons. This does not include the losses from breathing caused by minor temperature changes, barometric changes, wind pressures and other atmospheric changes which at times would double the loss due to one large change in temperature.

Cooling Systems

In addition to vapor-tight tankage, some refiners have installed cooling systems on their gasoline storage tanks for reducing breathing and filling. Others have tried various forms of insulation on tanks or a combination of insulation and cooling, such as a water spray under the insulation on a tank.

The effect of any cooling system on evaporation is twofold; first, it keeps the vapor temperature in the tank more uniform, thus reducing the actual breathing of the tank, and second, it reduces the vapor temperature and the temperature of the surface of the liquid in the tank and hereby reduces the percentage of the gasoline vapor in the air space above the liquid.

When a tank "breathes in" at night, the vapor space above the oil is filled with unsaturated air, (i. e., air containing no gasoline vapor). On coming in contact with the liquid, the air absorbs gasoline vapor; the amount which it will absorb depends on the temperature of the liquid surface, the higher the temperature the higher the percentage of gasoline vapor absorbed. During the day temperature of the air and vapor increases and the mixture expands. Part of the air and vapor mixture is forced out of the tank through breather lines. If the temperature is high, as on a hot day, the air will contain a high percentage of gasoline vapor. As previously mentioned, observations on tanks during the summer have shown that vapor expelled from the tanks contained over 80 per cent gasoline vapor. By means of cooling systems this percentage may be greatly reduced.

Comparative Tests

Test No. 1: In order to compare the efficiency of the two water cooling systems now in use in preventing evaporation losses, a test was made in which observations were taken on three 250-barrel vapor tight tanks filled with gasoline of 59.5° gravity (A. P. I.). One tank was equipped with a water spray and one with a water seal roof. The third tank had no cooling system of any kind. The arrangements of these tanks are shown in figure 1. As these tanks were erected especially for this test, great care was taken in making them vapor tight. They were of the latest type of bolted construction, with the roofs tied to the rafters to prevent any flapping motion when the tank breathes.

After the tanks were filled, the filling lines were disconnected at the valves and the open ends stopped with plugs in order to eliminate any chance of leakage. The pressure and vacuum relief valves on all three tanks were set at about two ounces.

Each tank was equipped with two gauge hatches located on opposite sides of the tank. Great care was taken in gauging the test tank. Two gauges were taken at each hatch, one an "outage" gauge (with a hook gauge) and one an "inage" gauge using a regulation steel tape with a seven inch plumb bob. At the time of gauging the temperature of the oil was determined using a thief thermometer.[2] Temperatures were taken of the gasoline six inches below the surface, the middle of the tank, and six inches from the bottom of the tank. Average samples of the gasoline were taken each time the tank gauged.

No attempt was made to divide this test into any predetermined parts, observations being made so that the rate of evaporation of the gasoline could be determined for average spring and summer conditions.

Table 1 gives the results of the first test.

The actual value of the volume of gasoline lost is considerable, but is relatively small in comparison to the cost of reblending the product to make it meet its original specifications. The following table gives the changes in

TABLE 1

Results of evaporation tests on gasoline in water spray, water seal and non-cooled tank:

	Tank No.1 (Spray)	Tank No. 2 (Water Seal)	Tank No. 3 (No Cooling System)
Loss April 24-June 6, barrels	0.45	0.63	1.54
Loss June 6-July 17, barrels	1.08	1.48	2.09
Total loss	1.53	2.11	3.63
Total loss in per cent (85 days)	0.65%	0.9%	1.54%
Total gravity loss in degrees A. P. I.	0.2	0.3	0.6

TABLE 2

	Beginning of Test (Gasoline same in all tanks.)	End of Test Tank No. 1 (Spray)	Tank No. 2 (Water Seal)	Tank No. 3 (No Clg. Sys.)
First Drop—	112° F.	126° F.	129°F.	133° F.
10%	170	180	181	181
20%	200	205	205	205
30%	222	226	226	230
40%	244	248	248	252
50%	264	268	170	271
60%	290	289	291	295
70%	314	320	324	330
80%	348	356	356	358
90%	390	399	399	403
End point	435	442	442	443
Recovery	97%	97.6%	97.7%	97.2%
Total rise in initial boiling point		14° F.	17° F.	21° F.
Total rise in end point		7° F.	8° F.	7° F.

TABLE 3

Temperatures of gasoline in water-spray, water-seal and non-cooled tanks.

Date—	—Tank No. 1— Surface Temp. of Gasoline	Average Temp. of Gasoline	—Tank No. 2— Surface Temp. of Gasoline	Average Temp. of Gasoline	—Tank No. 3— Surface Temp. of Gasoline	Average Temp. of Gasoline
May 10, 1923	70° F.	63° F.	71° F.	68° F.	8?° F.	?7° F.
June 11, 1923	81	75	84	80	9?	?1
July 17, 1923	89	83	96	90	108	91
Average	80	74	83	79	94	80

[2]Wiggins, J. H. Evaporation Losses of Petroleum in the Mid-Continent Field, U. S. Bureau of Mines Bulletin 200, 1922, p. 24.

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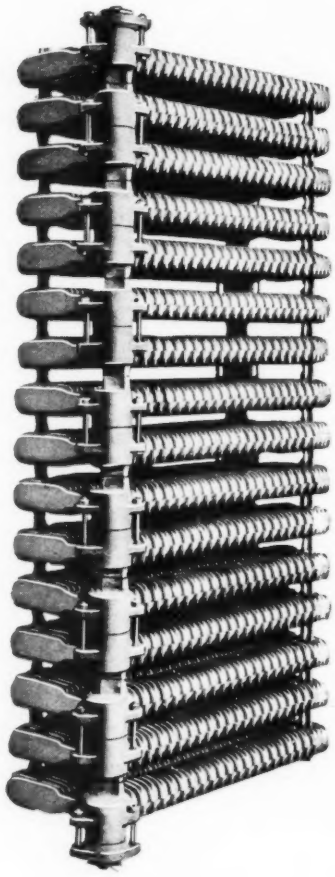

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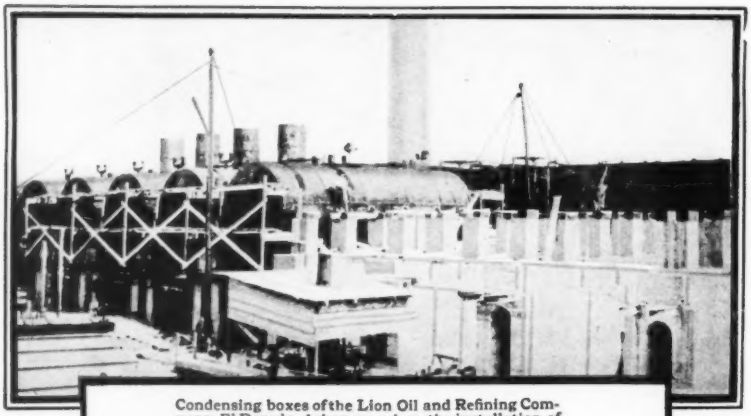

Condensing boxes of the Lion Oil and Refining Company, El Dorado, Arkansas, where the installation of Sterling Sections saved approximately $250 per box.

TABLE 4
Vapor temperatures in water-spray, water-seal and non-cooled tanks.
Temperatures from April 24 to May 8, 1923.
(Spring temperatures)

	Tank No. 1 (Water Spray)	Tank No. 2 (Water Seal)	Tank No. 3 (No Cooling System)
Average high	79° F.	79° F.	94° F.
Average low	56	62	59
Average vapor temperature	68½	70½	76½
Average daily variation	23	17	35
Temperatures of vapors from June 27 to July 4 (Rainy period)			
Average high	89	89	113
Average low	64	78	68
Average vapor temperature	76	83	90
Average daily variation	25	11	45
Temperatures of vapors from July 6 to July 14 (Summer temperatures)			
Average high	94	98	125
Average low	77	89	79
Average temperature of vapor	82	93	102
Average daily variation	17	9	46

distillation record of the gasoline in each tank.

The above results indicate that a water-spray system is somewhat better than a water-seal roof for reducing evaporation. This is due to the cooling effect caused by the evaporation of the thin film of water on the roof of the tank as well as the cooling of the sides of the tank by the spray. A properly installed spray will cool both the roof and the sides of a tank. The actual cooling effect of the water is shown by the temperature records given in the following table.

From the above it will be noted that the average surface temperature of the liquid in the spray-cooled tank is 14°F. below that in the non-cooled tank and 3°F. below that in the tank with the water-seal roof. However, there was an unusual amount of rainfall during the months of May and June. The effect was to lower the difference in the average temperature and thus reduce the advantage of the spray tank. Temperatures were taken July 17 after some 20 days of average summer weather. The average temperature of the liquid in the water-spray tank was 19°F. below the temperature in the non-cooled tank and 7°F. below the water-seal roof.

Recording thermometers placed in the vapor space gave the daily atmospheric variation in temperature of the vapor above the gasoline.

Table 4 gives the condensed records of these temperatures during three two-week periods of the test.

Discussion of Vapor Temperatures

Throughout the test the average daily variation of temperature of vapor in the water-seal tank was much less than that of the other two tanks. The average temperature of the vapor in the water-spray tank, however, was considerably lower than in either the water-seal or non-cooled tank. The ratios of daily average variations and average vapor temperatures between the three tanks varied materially. There were constant showers during the months of May and June. The rains had a tendency to place all three tanks under the same conditions, that is, a water spray. For example, the average daily variation in temperature between the water-seal tank and the water-spray tank 6, 14, and 8 degrees during the three periods specified in Table 4. The water-seal tank was more effective in comparison with the spray tank during the rainy season than during the other periods. The reason for this was that the water-seal tank had in reality, a combination water-seal and spray-cooling system a great part of the time.

Conclusions

The question of water cooling is primarly a question of cost. In this test the water-spray tank used an average of 1200 gallons per twenty-four hours. However, the same amount of water would maintain a water spray over a tank of twice the diameter of the 250-barrel tank tested, for the spray used was an ordinary garden sprinkler with the arms so adjusted as to cover the tank roof. The minimum amount of water was used to keep the arms revolving. Thus the availability and cost of water in a given locality would determine the feasibility of using a water-spray cooling system. The results given in Table 1 show that while the losses by evaporation from a vapor-tight tank are small, a water-cooling system used in the hot summer months will cut the rate of evaporation from a vapor-tight tank in half.

(To be concluded in the next issue, which takes up the second test.—Editor.)

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Pipe Stills Aid Output Of Skimming Plants

(Continued from page 13)

open the tube ends and clean them with the regulation tube cleaners, as, for instance; a heater designed to run 2500 barrels per day may be run at 3000 per day for, say 10 days, at the end of which time 30,000 barrels will have been run, leaving two days in which the heater could be shut down if desired, as 10 days run at capacity (2500 barrels) would be 25,000 barrels.

This is merely a suggestion, but it is a proven fact in the case of all pipe stills that operating results are better from all angles when the stills are operated at above capacity (in reason) than when operated below capacity.

Handling of Hot Oil and Vapors

When the vaporized light products leave the pipe still together with the residual oil the whole mass is expanded into a separating drum, where the vapors are led off through a vapor line to the condenser, and the residual oil pumped from the separating drum into storage or into other stills for further reduction or treatment.

One type of separating drum which works satisfactorily may be described as follows: A horizontal cylinder very much like a cylindrical still upon a regular still setting, equipped with bottom steam sprays, top steam line, pumping out line, vapor line, safety and vacuum valve, angle thermometer, and a long gauge glass showing the oil level at all times. The outlet line is provided with a tee, set bull headed inside the drum, so that the drum will not be pumped dry. A burner may be provided to control the temperature of the drum if so desired. The design of the separating drum is subject to considerable variation.

The hot residual oil is pulled through a suitable heat exchanger by the residue pump where the heat transfers to the ingoing cold oil to the pipe still.

A complete installation, pipe still, condenser, heat exchanger, pumps, dephlegmators, and etc., requires very little ground space, provided the latest type of condenser is used, a space 30 by 100 feet being ample for all equipment including receiving house, necessary to handle 5000 barrels per day. This does not include tankage.

A typical set up may be described as follows: pipe still, which is equipped with all necessary temperature and pressure recording instruments; steaming out line and walkways; stack 100 to 150 feet high; damper; separating drum equipped as described above; Southwestern condenser and dephlegmator; vacuum valve placed in vapor line above condenser (the vacuum valve is placed at this point to prevent a vacuum on the separating drum as the Southwestern condenser cools the vapor very rapidly); support for condenser and dephlegmator; oil meter to record the in-put; receiving house; three pumps manifolded for interchangeable service, two only being used, one for pumping oil to the still and one pumping out, leaving one in reserve (it is advisable to use pumps with pot or black valves if heavy oils are run), the pumps may be equipped with recording pressure gauges; receiving house manifold to direct the stream into the proper tank (probably the Merco-Nordstrum self lubricating valve is the best for this service); heat exchanger of suitable type.

Starting Up Pipe Still

The brick work and insulation must be thoroughly dried before starting active operations, to prevent undue cracking of walls, etc., and may be accomplished best with a slow wood fire over a period of four to eight days, gradually increasing the intensity of the fire.

When all the lines are tested, furnace dried and all details looked after the still is ready for operation. The crude or other oil to be run is pumped through the still and pumped out from the separator at the same time, the fires are lighted in the furnace and the temperature steadily raised until the operating temperature is reached when the still is in active operation.

While the temperature is being brought to the desired degree the oil is being circulated through the pipe still and into a tank and back again. This same oil is recirculated until the contents of the circulating tank is of the proper test and at this point fresh oil is introduced, and as the still is at the proper operating temperature the outgoing oil is tested.

Chicago, Ill.—D. L. Owsley of Tulsa has been named receiver of the Sapulpa Refining Company with offices here and in Tulsa, and a modern refinery at Sapulpa, Oklahoma.

Kansas, City, Mo.—Traffic managers of Mid-Continent refineries met here the last of October for a discussion of transportation matters affecting the industry. P. M. Miskell, chairman of the traffic committee of the Western Petroleum Refiners Association, presided. Conferences were held in Tulsa preceding the Kansas City meeting.

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Uses and Limitations Of Charcoal Process

(Continued from page 10)

alone where the writers have had opportunity to study conditions, it is estimated that 9,000,000 gallons of gasoline are lost annually in the residue gas of existing plants. Charcoal process plants to extract 6,000,000 gallons of this lost gasoline would undoubtedly prove a financial success. When one considers that one county alone in Texas is unjustifiably wasting annually almost $1,000,000 worth of a product useful in motor fuel, it would appear that the charcoal process ought to be given serious consideration by the natural gasoline manufacturers.

There are quite a few plants in the Mid-Continent field that lost more than 4000 gallons of gasoline daily by low extraction in hot summer weather. It is therefore apparent that quite a few of our natural gasoline manufacturers are doing themselves an injustice by failing to grasp the advantages afforded by the charcoal process in this particular field.

TABLE 1

Comparative Tests of Charcoal Process Plants and Other Gasoline Extraction Processes, Showing Ratio Between Yield and Charcoal Test Yield.

Plant No.	Process	Yield by Charcoal Test	G.P.M. by Plant	Ratio (4)+(3)
1	Oil absorption	2.76	3.30	1.195
2	Oil absorption	2.10	2.28	1.085
3	Oil absorption	2.55	2.51	0.984
4	Oil absorption	1.69	2.01	1.190
5	Oil absorption	1.06	1.04	0.982
6	Oil absorption	1.25	1.27	1.032
7	Oil absorption	0.175	0.121	0.69
8	Oil absorption	0.516	0.381	0.74
9	Oil absorption	0.234	0.268	1.145
10	Compression	1.45	1.80	1.24
11	Compression	1.33	1.40	1.05
12	Compression	1.83	1.42	0.78
13	Compression	2.38	1.83	0.77
14	Charcoal	1.45	2.68	1.849
15	Charcoal	0.410	0.788	1.92
16	Charcoal	0.360	0.384	0.065
17	Charcoal	1.000	1.67	1.67
18	Charcoal	0.175	0.210	1.20

Average ratio for charcoal process plants..1.54
Average ratio for other extraction processes .99

TABLE 2

Estimated Manufacturing Costs

*Items	Charcoal Process Plts. Cents per Gallon Plt. 1	Plt. 2	Plt. 3	Oil Abs'n Cents per Gal. Avg. Plt.
Interest at 8%.....	0.45	0.83	0.39	0.80
Depreciation	1.11	2.08	0.97	1.80
Insurance and taxes....	0.10	0.17	0.09	0.10
Superintendence & labor	0.56	0.84	0.00	0.98
Maintenance and general supplies	0.73	1.25	0.50	1.06
Sale gasoline and tank car rentals	1.00	1.00	1.00	1.00
Testing, teaming, trucking and auto expense.	0.20	0.30	0.10	0.25
General overhead and miscellaneous expense.	0.15	0.25	0.10	0.35
Fuel and water expense.	1.50	0.20	0.10	0.30
Totals	5.82	6.92	3.25	6.64

*Note that process and gas royalties are omitted.

TABLE NO. 3

Process Royalties Which Under Most Favorable Circumstances the Charcoal Process Is Able to Bear and Allow Manufacturer 50% Return Annually on an Investment.

(Based on Plant No. 3, Table No. 2)

Selling Prices Cents per Gallon	Gas Royalty Cents per Gallons (25%)	Total Manufacturing Costs Cents per Gallon	Process royalty remaining after allowing manufacturer 50% return annually on his investment Cents per Gallon	Per cent of sale Price
8	2.0	7.29	0.71	9
10	2.5	7.79	2.21	22
12	3.0	8.29	3.71	31
14	3.5	8.79	3.21	37
16	4.0	9.29	6.71	42
18	4.5	9.79	8.21	46
20	5.0	10.29	9.71	49

Note—Interest on investment not included in cost.

TABLE No. 4

Estimated Profits Accruing to Manufacturer Using Charcoal Process When Paying 10% Process Royalty

(Based on Plant No. 3, Table No. 2)

Selling Price. Cents per Gallon	Gas Royalty Cents per Gallons (25%)	Process Royalty Cents per Gallon (10%)	Total Manufacturing Costs Cents per Gallon	Manufacturer's Profits Cents per Gallon	Per cent annually
6	1.5	0.6	4.96	1.04	21
8	2.0	0.8	5.66	2.34	48
10	2.5	1.0	6.36	3.64	75
12	3.0	1.2	7.06	4.94	102
14	3.5	1.4	7.76	6.24	128
16	4.0	1.6	8.46	7.54	155
18	4.5	1.8	9.16	8.84	182
20	5.0	2.0	9.86	10.14	208

Note—Interest on investment not included in cost.

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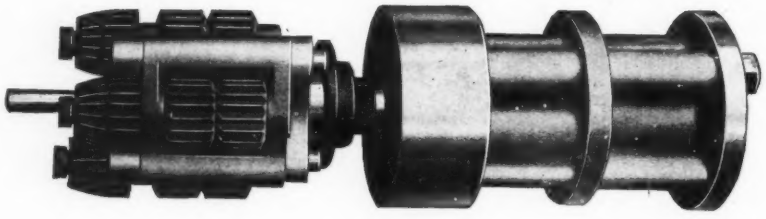

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PERSONNEL OF THE INDUSTRY

George T. Yost has arrived at the Smith's Bluff refinery of the Pure Oil Company, where he will assume the duties of chief chemist. Mr. Yost was formerly connected with the Magnolia Petroleum Company at that company's Beaumont refinery.

Harry B. Van Emden, chemist for the Panhandle Refining Company at Wichita Falls, Texas, departed for New York City November 7 upon news of the accidental death of his father, Henry B. Van Emden, an official of the New Pitt Gas Company of Pittsburgh and New York City, in the latter city on November 6.

The Calorizing Company of Pittsburgh announces the appointment of Roy Muir Ellis as New England sales manager with headquarters at Boston. Mr. Ellis is a member of the A. S. M. E. and was formerly connected with the Brown and Sharp Manufacturing Company.

G. A. Binz, sales manager of the American Schaeffer and Budenberg Corporation, was away from his headquarters in Brooklyn, New York, during the first part of October on a tour of the Mid-Continent field, which included a visit to Tulsa during the Petroleum Exposition there.

Announcement is made by Houston B. Tehee, receiver, of the removal of the general offices of the Continental Asphalt and Petroleum Company from Oklahoma City to Shreveport, Louisiana.

Barnsdall Refining Company through George D. Locke, vice president, announces the opening of a Detroit office at 104 Monroe avenue in charge of Roy R. Fisher.

Dr. R. M. Isham, formerly chief chemist of the Empire Refineries, and now head of the Okmulgee, Oklahoma, Chemical and Clinical Laboratory, spoke on "Cracking Processes" at the October 13 meeting of the Okmulgee District Oil and Gas Association.

H. G. James of Wichita, Kansas, sales manager of the Derby Oil and Refining Company, was one of the speakers at the annual meeting of the New York Oil Producers Association at Wellsville, New York.

John J. Jones, attorney for the White Eagle Oil and Refining Company, suffered a stroke of paralysis in October and was forced to be away from his offices in Wichita, Kansas, for a time.

D. E. BUCHANAN
President of the Association of Natural Gasoline Manufacturers

John D. Reynolds, corporation counsel of Chicago and formerly secretary of the Western Petroleum Refiners Association, has been named secretary of the American Oil Men's Association, succeeding Walter Willard who resumes his old position as field secretary.

E. L. Doheny, president of the Pan-American Petroleum Company, arrived in New York the latter part of October in connection with company business.

F. E. Powell, chairman of the board of the Anglo-American Oil Company, sailed for England on the liner Aquitania the latter part of October after a six weeks' business stay in the United States.

Sir Henri Deterding, general managing director of the Royal Dutch-Shell group, arrived in New York the first part of November from London for a business trip in this country and in Mexico.

S. E. Murphy of the sales department of the Empire Refineries, Inc., of Tulsa, visited the district offices of the company in Fort Worth during the last week in October.

Leland V. Stanford, vice president of the Sinclair Refining Company of New York with headquarters at New York City, arrived in Beaumont late in October via the water route and visited in Houston before starting on a hunting trip arranged for by a group of friends. Stanford plans to visit the refining centers in North Texas while in the South.

D. W. Salisburg of the Southwestern Condenser Company, New York, was in the Mid-Continent and Texas during the past few weeks.

An organization to be known as the New Mexico Oil and Refining Company is being formed by W. R. Childers and associates of Gallup, New Mexico, for the purpose of manufacturing natural gas gasoline and carbon black. The plant for which machinery has already been ordered will be located at Aztec and will be supplied with gas from two producing wells near that city.

Walter G. Schultz, formerly with the Montrose Oil Refining Company of Fort Worth and lately of Long Beach, California, has accepted a position with the Louisiana Oil Refining Corporation at Shreveport as assistant sales manager.

C. P. Clark, chief engineer of Clark Brothers Company, was away from his office in Olean, New York, during October on a tour of the oil country, which included a visit in the Texas and Oklahoma fields.

P. A. Conway, commerce counsel and traffic manager of the Western Petroleum Refiners Association, has moved from Topeka, Kansas, to Tulsa, where he will make his home.

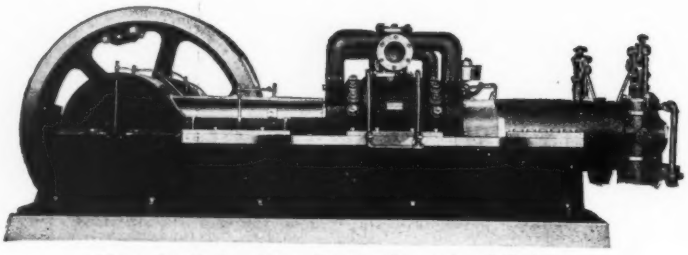
T. B. Hancock, agent of the Producers Refining Company at Dallas, Texas, has been transferred to Denver, Colorado, as manager of the Colorado division of the Cities Service Oil Company. W. S. VanTreese, agent at Waco, Texas, succeeds Hancock at Dallas and T. W. Moss has been appointed agent at Waco.

John H. McCoy, president of the Keener Oil and Gas Company and its subsidiary the Akin Gasoline Company, was away from his office in Marietta, Ohio, during October and the first part of November on a trip to the Mid-Continent field.

J. M. Wilson of Pittsburgh, vice president of the National Supply Companies, is visiting the company's branch offices in the oil country.

O. B. Seyster, formerly of the public relations department, gas division, of the Empire Companies of Bartlesville, Oklahoma, has been made manager of the gas distribution office of the Empire at Arkansas City, Kansas.

THE NEW ENCLOSED TYPE



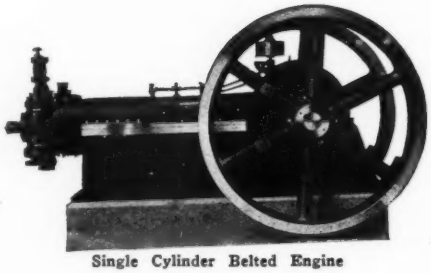
Direct Gas Engine Driven Vacuum Pump, Two Cylinder

Watts-Miller Gas Engines and Direct Gas Engine Driven Compressors and Vacuum Pumps

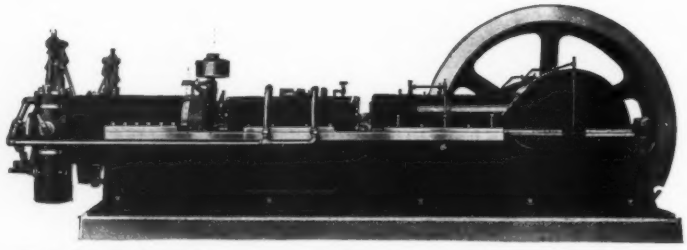
Pat. June 22, 1897; Oct. 6, 1914; April 13, 1915

High Efficiency Gas Engines, Compressors, and Vacuum Pumps for Power Plant Equipment

Sizes from 50 to 400 h. p.



Single Cylinder Belted Engine



Direct Gas Engine Driven Compressor, Two Cylinder, Single or Two Stage

Compressors particularly adapted to casing-head gasoline plants, gas pumping plants, and compressed air installations, in single and 2-stage machines to operate on practically all intake and discharge pressures. Continuous circulating filtering automatic oiling system.

The Miller Improved Gas Engine Co.

SPRINGFIELD, OHIO

DISTRIBUTORS

BRANCH SALES OFFICE
323 North Cheyenne Ave.,
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FRICK-REID SUPPLY CO.
Casper,
Wyoming.

Service Department and Warehouse, 323 North Cheyenne Ave., Tulsa.

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RECENT REFINERY PATENTS ISSUED

BY STAFF REPRESENTATIVE

Washington, D. C.—The following patents of interest to the oil refining industry have recently been issued by the Patent Office at Washington:

No. 1,470,353, issued on October 9 to Gustav Egloff and Harry P. Benner, assignors to Universal Oil Products Company, Chicago, Illinois, a corporation of South Dakota. The patent covers an apparatus for cracking oil, comprising a heating chamber, a coil in said chamber through which the oil passes, a vapor chamber communicating with said coil, a plurality of vapor outlets from different parts of said vapor chamber, and a dephlegmator in communication with each of said outlets, a series of drawoff lines leading from said dephlegmators, a common header communicating with said lines, means for cutting off one or more of said lines and a vapor outlet from said heater.

No. 1,471,088, issued on October 16 to Albert M. Ballard, assignor to Sun Oil Company, Philadelphia, Pa., a corporation of New Jersey. The patent covers, in an oil and gas separator, the combination with a tank having an oil and gas inlet, an oil outlet arranged at a relatively low elevation, a gas outlet arranged at a relatively high elevation, the fluid admitted to the tank dividing into a lower body of oil and a superincumbent body of gas containing oil in suspension, of a separator acting upon the outflowing gas to clean the same by separating the oil therefrom, an oil receiving surface over which the oil flows from the separator back to the body of oil in the tank, and means to direct the flow of oil from the separator to said oil receiving surface throughout the flow of said oil, in the general direction of the flow of gas through the separator.

No. 1,471,201, a patent on a method of producing a material for the treatment of oils, issued on October 16 to Paul W. Prutzman and Carl J. Von Bibra, assignors to General Petroleum Corporation, Los Angeles, Calif., a corporation of California. The patent pertains to the method of producing a decolorizing and purifying agent for oils, which consists in first forming a mudded mass from non-spent mineral earth, then subjecting the said mudded mass to the action of an acid for the separation therefrom of acid soluble bodies, removing the acid and reaction products from the insoluble portion of the said mass by the application of water, thickening the mass by the withdrawal of excess wash water therefrom and maintaining the said treated body until used in a mudded condition to prevent contact of air with the solid particles thereof.

No. 1,471,374, issued on October 23 to Richard C. Aland, Detroit, Michigan, on an oil refining device for internal combustion engines comprising a casing providing a chamber, oil supply and return passages leading from the chamber to the crank case of the engine, filtering means through which the oil must pass in entering the chamber, means controlled by the level of oil within the chamber for alternately submitting the same to and relieving the same from a partial vacuum while the engine is in operation, a casing enclosing the first named casing and greater in length than the first named casing providing a chamber and passageway for heated gases about the oil chamber, said supply line having a coil in the lower portion of the outer chamber below the oil chamber and about which the exhaust gases flow in passing into the outer chamber.

No. 1,472,075, issued on October 30 to Joseph W. Lewis, assignor to The Atlantic Refining Company, Philadelphia, Pa., a corporation of Pennsylvania. The patent covers a petroleum-treating apparatus consisting of a condenser structure, comprising initial and terminal manifolds, a header through which vapor may be supplied to said initial manifolds under pressure, upwardly extending and downwardly returning pipes connecting the said initial and terminal manifolds, and means for separately withdrawing from the terminal manifolds the gaseous and liquid products of condensation.

No. 1,472,116, issued on October 30 to Henry L. Doherty, New York, N. Y., on a process of distilling oil. It covers the process which comprises establishing and maintaining a higher temperature in the middle portion of a device like the column still than obtains in portions below the above, establishing and maintaining transverse bodies of oil across such device at different levels and at different temperatures, passing the feed of petroleum oil downward through such device, such oil flowing in heat transferring relationship to, but out of contact with alternate bodies and feeding to and being removed from intermediate bodies, and withdrawing liquid as a distillate from such alternate bodies; a current of gases being kept flowing upwardly through said device to maintain the localized high temperature of the middle portion.

No. 1,472,384, issued on October 30 to Walter Arthur Brown, Los Angeles, Calif., on a process of separating hydrocarbons from water. The patent covers a process for separating hydrocarbons and water from a mixture thereof, admixing alcohol with said mixture, to thereby free the water from the hydrocarbons, then heating the whole admixture under pressure sufficient to present water vaporization, but allowing vaporization of the alcohol and of the lighter hydrocarbon constituents.

No. 1,472,385, issued on October 30 to Walter Arthur Brown, Los Angeles, It relates to a process for separating hydrocarbons and water from a mixture thereof, admixing with such mixture finely divided absorbent clay, then heating the admixture and allowing the water and precipitant to settle.

LUCEY

"Wherever LUCEY There's Oil"

STEEL CASTINGS FOR REFINERIES

Open Hearth Process
Quick Delivery—Made in Houston
From One Pound to 8000 Pounds
Analysis of Every Heat Controlled in Our Own Laboratories, Insuring Uniform Quality.
Complete Pattern Shop, Machine Shops, Metallurgical and Engineering Staff at Your Disposal.

R. U. CULBERSON, Receiver
LUCEY MANUFACTURING CORPORATION OF TEXAS
Houston, Texas

Beaumont, Texas Shreveport, La. El Dorado, Ark. Mexia, Texas
Smackover, Ark. Corsicana, Texas Dallas, Texas

STEEL

REFINERY AND GASOLINE PLANT EXHIBITS AT TULSA EXPOSITION

Tulsa, Okla. — Exhibitors showing refinery equipment during the International Petroleum Congress and Exposition which met in Tulsa from October 8 to 14, were as follows:

Hope Engineering & Supply Company, Mt. Vernon, Ohio—Represented by D. W. McKay and J. M. Story, Tulsa, Oklahoma. Exhibit consisted of a new type heat exchanger with large areas to accommodate absorption gasoline manufacturers where they operate with still pressure.

Key Boiler Equipment, East St. Louis, Missouri.—Represented by F. A. Post, district manager, Houston, Texas, and Fred Key, vice-president of the company. Exhibit consisted of steam plant and refinery equipment.

Silumite Products Corporation, Philadelphia, Pennsylvania. — Represented by D. V. Ault, Philadelphia. Exhibit consisted of steel protective paint, acid proof, non-corrosive, especially adapted to oil refineries and tanks.

Walworth Manufacturing Company, Boston, Massachusetts. — Represented by W. C. Garza, assistant manager sales, western division; Julius Schoekel, sales representative, and D. F. Moran, sales representative. Exhibit consisted of Kewanee Specialties, brass valves, and Stillson wrenches.

Gas-Tite Device Company, Pawhuska, Oklahoma.—Represented by T. H. Boyd and W. G. Kiser. Exhibit consisted of tanks showing gas-tite devices in place.

Dean E. Foster, consulting engineer, Tulsa, Oklahoma. Exhibit consisted of Foster Baffles for absorption gasoline plants.

Universal Oil Products Company, Chicago, Illinois.—Represented by C. P. Dubbs, W. R. Howard, S. Olsen, George Simonds, C. J. Pratt, A. R. Chandler, and M. J. Bogardus. Exhibit consisted of a unique model of Dubbs Cracking process.

Victory Manufacturing Co., Niles, California.—Represented by E. E. Matheson, Niles, California, engineer, and O. Kelly agent for the Mid-Continent district. Exhibit consisted of double packed stop-cock valves for refineries.

The Calorizing Company, Pittsburgh, Pennsylvania.—Represented by A. V. Farr, vice-president, E. W. Long, western sales manager; J. F. Isaacs, district sales manager; A. M. Risdon, district sales manager, and C. A. Englert, service engineer. Exhibit consisted of a plain steel tube and a calorized tube both of which had seen service in a Ramage cracking unit.

Standard Tank Car Company, St. Louis, Missouri.—Represented by F. A. Singler, sales manager southwestern district, and Frank Thompson, manager in charge of the southwestern district. Exhibit consisted of a photographic arrangement showing the details of tank car construction.

Henry Vogt Machine Company, Louisville, Ky.—Represented by W. S. Cannon, Jr., Louisville salesman. Exhibit consisted of drop forge steel valves and fittings for high temperatures and pressures as found in oil refineries, and a full line of refinery equipment.

C. J. Tagliabue Manufacturing Co., New York.—Represented by F. D. Harger and W. A. Schlueter. Exhibit consisted of latest oil testing instruments, and Mono Air Recorders.

The Braun Coporation, Los Angeles, California. — Represented by M. J. Holmes. Exhibit consisted of refinery laboratory equipment.

Landis Machine Company, Waynesboro, Pennsylvania.—Represented by C. N. Kirkpatrick and H. W. Marker. Exhibit consisted of a 12-inch pipe threading and cutting machine, sold during the exposition.

Gasoline Products Company, associated with Cross Widdel Engineering Company, Kansas City.—Represented by Dr. Walter Cross, Dr. Roy Cross, inventors of the Cross Cracking Process, H. E. Widdel, Mr. Chapin, G. H. Clay. Exhibit consisted of a scale model of a Cross Cracking Unit

The Foxboro Company, Tulsa, Oklahoma.—Represented by W. C. Brown, genaral manager, A. J. Kerr, J. B. McMahon and H. L. Bailey. Exhibit consisted of vacuum and pressure meters, and a complete line of indicating and recording gauges.

Crane Company, Chicago.—Represented by Edmund Burke, Mr. Link, Mr. Hoffman, C. D. Little and N. E.

The Reeves Vertical Gas Engine-Compressors for Gas Booster Plants

A few of the reasons why leading companies and engineers are purchasing the Reeves Gas Engines and Compressors.

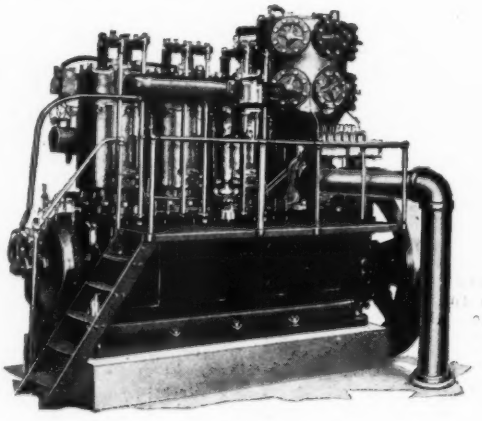
They know the Reeves unit is not an experiment, having proven its reliability and worth over a period of about twenty years successful service.

Account of the simplicity of operation; low fuel and maintenance cost per horse power. One user just reported having operated last four units 16 months without shutdown.

All Compressors equipped with "Hope" Biplane, Patented, easy operating, high speed Valves.

Saving in installation time partly pays for unit.

Saving in plant construction cost from 20 to 50 per cent depending on location.



Engine Sizes:
40 H. P. up to 250 H. P.

Engine-Compressor Sizes:
60 H. P. up to 160 H. P.

Consulting and Contracting Engineers in Natural Gas and Oil.

HOPE ENGINEERING & SUPPLY CO.
Mt. Vernon, Ohio, U.S.A.

Branches Pittsburgh, Penna. Tulsa, Okla. Casper, Wyo.

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Bleuler. Exhibit consisted of refinery and pipe line valves and fittings for all pressures.

Clark Brothers, Olean, New York, and Gas Engineering Construction Co. Pittsburgh, Pa.—Represented by C. P. Clark, secretary and assistant treasurer, Olean, N. Y.; William G. Cummings, president of the Gas Engineering Construction Co., Tulsa; O. B. Agner, sales engineer, Pittsburgh; William Bendean, sales engineer, Olean, N. Y., and C. L. Cron, district manager, Casper, Wyoming. Exhibit consisted of a Clark 80 h. p. direct driven gas compressor and Clark Jr. drilling engine.

P. H. & F. M. Roots Company, Connorsville, Indiana.—Represented by W. L. Sexton and W. Woodbank. Exhibit consisted of a complete line of rotary pumps for oils, gases and water.

"Floridin Company," Warren, Pennsylvania.—Represented by W. L. MacGown, vice-president and general manager, Allen C. Jackson, secretary-treasurer and R. C. Wallace, chemist. Exhibit showed filtering of lubricating and petroleum products, demonstrating the bleaching properties of "Floridin Fuller's Earth."

Misscuri Paint & Varnish Company, St. Louis.—Represented by A. B. Gross, Mr. Norris, G. W. Swearingen, Park D. Cole, A. P. Sinclair. Exhibit consisted of Portlan-Cem Cote, a special paint made from boiled linseed oil, Chinawood oil, turpentine, XX zinc, limeproof colors, and Portland cement. Also showed ""Sealoleak" asbestos liquid roofing.

Leader Iron Works, Decatur, Illinois —Represented by C. B. Irisn, R. F. Doepel and Earl R. Kyle. Exhibit consisted of tanks and refinery equipment featuring Rivet-Weld type of construction for stills, agitators, towers, condensers, etc.

Blackmer Rotary Pump Co., Petoskey, Michigan.—Represented by James Lyons, R. F. Leinberger, F. E. Goodwin. Exhibit consisted of rotary power and hand pumps.

The Wm. Powell Company, Cincinnati, Ohio.—Represented by R. D. Allen and Charles Cullen, Cincinnati. Exhibit consisted of White Star Valves, lubricators, oilers, grease cups, etc.

A. Y. McDonald Manufacturing Co., Dubuque, Iowa.—Represented by C. L. Reeder and C. W. Jackson. Exhibit consisted of gas-tite dome covers for loading and unloading casing-head absorption gasoline, and McDonald Swing Joints, Duplex tank vents, and a regular line of valves and fittings.

Southwest General Electric Co., Dallas, Texas, El Paso, Texas, Houston, Texas, Oklahoma City, Oklahoma, Tulsa, Oklahoma. Exhibit consisted of a two-speed oil well motor, lightning generators, arc-welding generators and Mazda lamps.

Bessemer Gas Engine Company, Grove City, Pennsylvania.—Represented by H. D. Murray, C. F. Fithian, B. L. Potter, F. B. Dunlap. Exhibit consisted of 165 h. p. Type 10, direct diven gas compressor in operation, running on its own power.

Truscon Steel Company, Younstown, Ohio.—Represtented by W. K. Sparks, W. L. Quigley and W. E. Moore. Exhibit consisted of literature and samples showing construction and material used in Truscon steel buildings.

Westcott & Greis, Tulsa, Oklahoma, Three companies exhibited in this booth; Westcott & Greis, materials for measurement and control of gas, air, steam, oil, and water, manufactured by Metric Metal Works, Erie, Pennsylvania; G. M. Davis Regulator Company, Chicago, regulators. Represented by G. C. Davis and G. M. Davis, Chicago; H. P. Westcott and E. A. Frank, J. C. Diehl, L. A. Adams, C. N. Payne, H. Wahl, E. V. Zull, A. J. McEwan, J. H. Satterwhite.

Pioneer Tank & Boiler, Tulsa, Oklahoma.—Represented by J. F. McKelvey, general manager. Exhibit consisted of tanks, plate work and general refinery and oil field storage products.

American Radiator Company, Buffalo, New York.—Represented by L. M. Butler, G. I. Morriss, C. A. Olson. Exhibit consisted of Sterling oil condensing sections.

National Tube Company, Pittsburgh, Pennsylvania.—Represented by W. L. Schaeffer, J. B. Graham, Jeff Greer, Mr. Kennedy, J. L. Smith and F. P. Brannan. Exhibit consisted of drill pipe, casing line pipe and various oil country specialty tubular goods.

Foamite Childs Corporation, Utica, New York.—Represented by H. P. Maginniss and A. E. Canaday. Exhibit consisted of Foamite fire extinguishers and engines.

De Laval Separator Company, New York City.—Represented by A. F. Meston, Captain Hazen Follansbee, and Paul S. Reed and Charles B. Smith. Exhibit consisted of centrifugal oil treating machines for cut oil and tank bottoms and for removing carbon from used lubricating oil.

American Cast Iron Pipe Company, Birmingham, Alabama.—Represented by E. L. Gilder, J. W. Ivy. Exhibit consisted of a model of cast iron pipe for condensing coils and samples of cast iron pipe for conveying water and gases.

American Car & Foundry Co., St. Louis.—Represented by C. A. Andrews. Exhibit consisted of tank car parts and photos of tank car construction.

Columbian Steel Tank Company, Kansas City.—Represented by E. E. Wild, H. R. Leland, J. S. Foley, C. L. Robinson and Tanks McPhail. Exhibit consisted of truck tanks, bolted tanks, welded tanks, vapor-tight tanks and illustrations of the safety floating decks.

The Phillips Carey Company, Cincinnati, Ohio.—Represented by J. C. Rector, L. F. Whitaker and W. F. Catlett. Exhibit consisted of heat insulating material as applied to high temperature work, roofing, pipe line paints.

American Schaeffer & Budenberg Corporation, successors to the Schaeffer & Budenberg Manufacturing Company, Brooklyn, New York.—Represented by O. F. Kluenter, G. A. Binz and A. E. Campbell. Exhibit consisted of recording thermometers, safety valves and recording and indicating gauges.

Eagle Pitcher Lead Company, Joplin, Missouri.—Represented by B. Bailey. Exhibit consisted of block lead, babbitts, white lead, blue lead, lead wool for drilling plugs.

Pratt & Whitney Company, Hartford, Connecticut.—Represented by B. H. Blood, Major Earl Buckingham, C. L. Goodrich. Exhibit consisted of master gauges on all sizes of pipe, Briggs standard, from one-eighth to six inches.

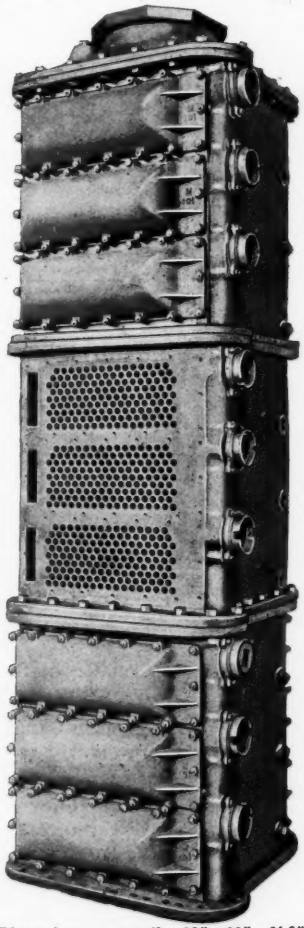
National Meter Company, New York City.—Exhibiting a full line of Empire oil meters.

Hills-McCanna Company, Chicago, Illinois.—Represented by A. H. Noyes. Exhibit consisted of Hills-McCanna plugs, valve stems and seats and thermometer wells.

St. Louis Surfacer & Paint Company, St. Louis, Missouri.—Represented by William T. Deacon and A. W. Deacon, vice presidents. Exhibit consisted of various kinds of metal steel aluminum paints demonstrated through literature and posters.

Type B-540
Gasoline Condenser
(Patented)

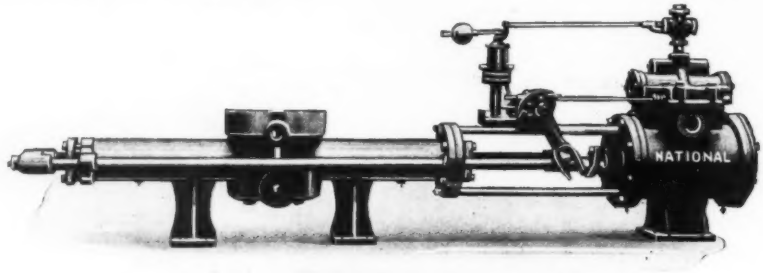
Compact — Efficient — Flexible



Dimensions — overall, 30" x 30" x 9'-0"
(inc. top and bottom bonnets)

SOUTHWESTERN CONDENSER COMPANY
1215-1221 Hollingsworth Bldg.,
Los Angeles, Calif.

Special High Pressure Oil Pump



Designed Especially for Use With Cross Cracking Process

"ALL NATIONAL" Pumps are equipped with Balanced Piston Valve Chests. This construction meets the demand where efficiency-endurance and absolute reliability at all times are essential. All pumps have heavy construction and large valve area, making them ideal for refinery pumps.

Our regular line includes:
High Pressure Pumps.
General Service Pumps.
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Air Compressors.
Vacuum Pumps.

OUR PRODUCT MEANS ECONOMY

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NATIONAL STEAM PUMP COMPANY, Not Inc.

UPPER SANDUSKY, OHIO, U. S. A.

Services Available for the Oil and Gas Industry As:

CONSULTING ENGINEERS in all matters pertaining to:
Pipe Line Transportation of Petroleum and Natural Gas
Recovery of Gasoline by Absorption or Compression
Compressing and Booster Plants
Gas Engines and Compressors

CONSTRUCTING ENGINEERS AND CONTRACTORS, specializing in:
Pipe Lines for Gas and Oil
Compressing and Booster Plants
Gasoline Recovery Systems, Absorption and Compression
City and Inter-City Gas Mains

No contract too large to complete with satisfaction and dispatch or too far away to handle.

MANUFACTURERS and DISTRIBUTORS of Gas and Oil Specialties, including:
Heat Exchangers
Gasoline Recovery Equipment
Compressing and Booster Station Equipment
Reeves Vertical Gas Engines and Compressors
Hope Biplane Compressor Valves
Hope River Clamps and Re-inforced Joints

Consulting and Contracting Engineers in Natural Gas and Oil.

HOPE ENGINEERING & SUPPLY CO.
Mt. Vernon, Ohio, U.S.A.

Branches Pittsburgh, Penna. Tulsa, Okla. Casper, Wyo.

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Mid-Continent Refinery Operations

As of October 15, 1923

ARKANSAS

Plant and Location—	Capacity	Now Running
Abner Davis, El Dorado	60	S D
Airedale Ref. Co., El Dorado	1,000	S D
Arkansas Ref. Co., Ft. Smith	1,000	S D
Ark. P. & R. Co., El Dorado	1,000	950
El Dorado P. L. & R. Co. El Dorado	2,000	S D
Farmer O. & R. Co., Texarkana	1,000	S D
Four States Ref. Co. Texarkana	400	S D
Grison Ref. Co. El Dorado	750	300
Jones Bros. & Tatum, El Dorado	1,000	200
Kettle Creek Ref. Co. Pearson	2,000	2,950
Lion O. & R. Co., El Dorado	12,000	7,100
Pine Bluff Ref. Co., Pine Bluff	1,500	500
Root Refineries, El Dorado	3,000	1,600
Shippers Pet. Co., El Dorado	1,800	S D
The Arkansas Ref. Co., Riodron	3,000	S D
Union P. L. & R. Co., El Dorado	4,000	S D
Total for Arkansas	35,460	13,600

KANSAS

Plant and Location—	Capacity	Now Running
Associated P. & R. Co., El Dorado	1,000	S D
Bell Prod. & Ref. Co., Wichita	700	S D
Commonwealth O. & R. Co., Moran	800	200
Derby Oil & Ref. Co., Wichita	5,000	S D
Chemical O. & G. Co., Osawatomie	1,000	S D
El Dorado Ref. Co., El Dorado	4,000	2,450
Frontier Ref. Co., Hutchinson	2,000	S D
Golden Rule Ref. Co., Wichita	800	500
Great Western Pet. Co., Florence	2,000	S D
Great Western Ref. Co., Erie	1,500	S D
H. & H. Ref. Co., Osawatomie	1,000	S D
Industrial Ref. Co., El Dorado	1,500	S D
Kanotex Ref. Co., Arkansas City	3,000	2,700
Kansas City Ref. Co., Kansas City	5,000	2,950
Kansas Oil Ref. Co., Coffeyville	2,000	400
Kansas Tex. O. R. Co., Wichita	1,500	S D
Interstate Refs., Inc., Centropolis	1,000	S D
Lesh Ref. Co., Arkansas City	1,500	S D
Lakeside Ref. Co., Augusta	2,500	800
Skelly Oil Co., Eldorado	12 000	10,100
Mutual Oil Co., Chanute	1,500	S D
Mecca Ref. Co., Augusta	2,500	S D
Marshall & Co., Sheffield	2,500	S D
Moore Ref. Co., Arkansas City	4,500	2,750
Mo-Kan Ref. Co., Kansas City	1,000	S D
McCree Pet. Co., Baxter Springs	600	S D
McWhorter-Chanute Ref. Co., Chanute	200	S D
Miller Pet. Co., Humbolt	1,500	S D
Nat. Ref. Co., Coffeyville	5,000	4,900
North Amer. Ref. Co., Rosedale	700	S D
Peerless O. & R. Co., Chanute	3,000	3,000
Richardson Ref. Co. El Dorado	2,000	400
Red Bird Ref. Co., Fredonia	800	rerun
Sinclair Ref. Co., Argentine	6,000	S D
Sinclair Ref. Co., Coffeyville	7,000	4,950
Sterling O. & R. Co., Wichita	5,000	2,000
Stand. O. Co., (Kans.) Neodesha	12,000	S D
Uncle Sam Oil Co., Argentine	700	S D
Uncle Sam Oil Co., Cherryvale	2,400	S D
Vickers Pet. Co., Potwin	1,800	1,500
White Eagle Ref. Co., Augusta	7,000	6,950
Total for Kansas	119,200	45,950

LOUISIANA

Plant and Location—	Capacity	Now Running
Caddo Central Oil & Refining Co. Shreveport	3,500	2,900
Caddo Central Oil & Refining Co. Shreveport	7,000	4,950
Crescent O. & R. Co., Cedar Grove	800	S D
Homer Ref. Co., Homer	250	S D
International Oil & Ref. Co., Shreveport	800	S D
Leeton Ref. Co., Shreveport	800	S D
Louisiana P. P. Co., Bossier	300	S D
Louisiana O. & R. Co., Shreveport	9,000	5,050
Red River Ref. Co., Crichton	1,500	S D
Paramount Pet. Co., Superior	3,000	S D
Paramount Pet. Co., Sheehan	5,000	S D
Shreveport Prod. & Ref. Co., Shreveport	4,500	2,950
Tarr Island, Mooringsport	300	S D
The Texas Co., Arlda	5,000	top'ing
Union Ref. & P. L. Co., Oil City	1,000	S D
Union Ref. & P. L. Co., Homer	1,000	S D
Total for Louisiana	43,750	14,850

MISSOURI

Plant and Location—	Capacity	Now Running
St. Joseph Vis. O. Co., St. Joseph	500	R R C
Standard Oil Co., (Indiana) Sugar Creek	12,000	6,900
Wilhoit Ref. Co., Joplin	2,000	850
Total for Missouri	14,500	7,750

OKLAHOMA

Plant and Location—	Capacity	Now Running
Acme Ref. & P. L. Co., Jennings	2,600	S D
Allied Ref. Co., Okmulgee	2,000	1,600
Associated P. & R. Co., Yale	1,000	S D
Barnsdall Ref. Co., Barnsdall	3,000	2,900
Bay State Ref. Co., Healdton	1,000	S D
Beaver P. & R. Co., Dilworth	700	S D
Bison Ref. Co., Quay	1,000	S D
Bolene Ref. Co., Enid	3,600	2,100
Bristow Gasoline & Sup. Co., Bristow	1,000	1,000
Buffalo Ref. Co., Yale	1,000	S D
Cushing Ref. Co., Cushing	1,000	S D
Cameron Ref. Co., Ardmore	3,500	2,800
Canfield Ref. Co., Yale	500	150
Carter Oil Co., Cortoco	12,000	S D
Champlin Ref. Co., Oilton	1,000	2,450
Chestnut & Smith Corp., Sand Springs	5,000	S D
Noble O. & G. R. Co., Oklahoma City	2,000	S D
Coleman-Nelson Corp., West Tulsa	2,000	S D
Coleman-Nelson Corp., Haskell	1,000	S D
Constantine Ref. Co., Devol	10,000	S D
Constantine Ref. Co., West Tulsa	4,500	S D
Cosden & Co., West Tulsa	35,000	18,950
Cushing Ref. & Gasoline Co., Cushing	2,500	2,100
Cyril Ref. Co., Cyril	1,200	800
Daisy Bell Pet. Co., Wilson	2,000	400
Damascus Ref. Co., Lawton	1,500	S D
Cushing Ref. & Gaso. Co., Blackwell	1,500	300
El Dorado Ref. Co., Yale	700	S D
Equality Ref. Co., Oilton	1,000	S D
Empire Refs. Inc., Cushing	5,000	3,450
Empire Refs. Inc., Okmulgee	2,500	2,450
Empire Refs. Inc., Okla. City	2,500	S D
Empire Refs. Inc., Ponca City	4,500	3,450
Francis Ref. Co., Francis	5,000	S D
Frederick Ref. Co., Frederick	5,000	S D
Fairmont Ref. Co., Fairmont	2,500	S D
Federal Oil & Ref. Co., Cushing	1,500	S D
Globe Oil & Ref. Co., Blackwell	4,000	1,200
Gilmer Oil Co., Ringling	8,000	200
Glen Braden Ref., Perry	1,000	S D
Golden Belt Ref. Co., Okla. City	200	S D
Grandfield O. & Ref. Co., Grandfield	3,000	1,200
Great Amer. Ref. Co., Jennings	2,500	S D
Hewitt Ref. Co., Hewitt	1,600	900
Home O. & R. Co., Yale	2,000	S D
Indian Chief Ref. Co., Cushing	1,800	S D
U. S. Cities Corp., Bristow	2,500	1,950
Imperial Ref. Co., Ardmore	6,000	5,950
Indianhoma Ref. Co., Okmulgee	9,000	S D
Illinois Oil Co., Cushing	3,000	800
Inland Ref. Co., Cushing	3,000	S D
Johnson Oil Ref. Co., Cleveland	2,700	2,700
Lawton Ref. Co., Lawton	1,100	S D
Livingston Ref. Corp., Walters	3,000	S D
Local Ref. Co., Oklahoma City	1,000	600
Marland Ref. Co., Ponca City	12,000	5,600
Marland Ref. Co., Covington (Operated by Pepper Gas Co.)	1,000	400
Mecca Ref. Co., Allen	1,500	400
Meridian Ref. Co., Okmulgee	3,000	S D
Meridian Ref. Co., Hominy	1,000	S D
Meridian Ref. Co., Ponca City	2,500	S D
Mid-Co. Pet. Co., West Tulsa	7,000	S D
North American Ref. Co., Pemeta	1,500	S D
Nyanza Ref. Co., Wilson	3,500	600
Oil State Ref. Co., Enid	2,500	600
Pontotoc P. L. & Ref. Co., Allen	600	S D
Omar Ref. Co., Garber	2,500	1,300
Oklahoma P. & R. Co., Muskogee	2,500	S D
Pawhuska Ref. Co., Pawhuska	1,000	S D
Waite Phillips Co., Okmulgee	4,000	2,150
Pierce Oil Corp., Sand Springs	9,000	4,500
Navajo Ref. Co., Sapulpa	2,000	800
P. & R. Corp., Blackwell	2,500	1,450
P. & R. Corp., West Tulsa	6,000	5,100
Pure Oil Co., Ardmore	7,000	2,950
Pure Oil Co., Cushing	6,500	5,950
Pauline Ref. Co., Hampton	1,200	500
Powerine Oil Co., Billings	500	S D
Pioneer Pet. Co., Guthrie	2,500	S D
Sheridan Ref. Co., Newkirk	2,000	S D
Rock Island Ref. & P. L. Co., Duncan	1,200	1,000

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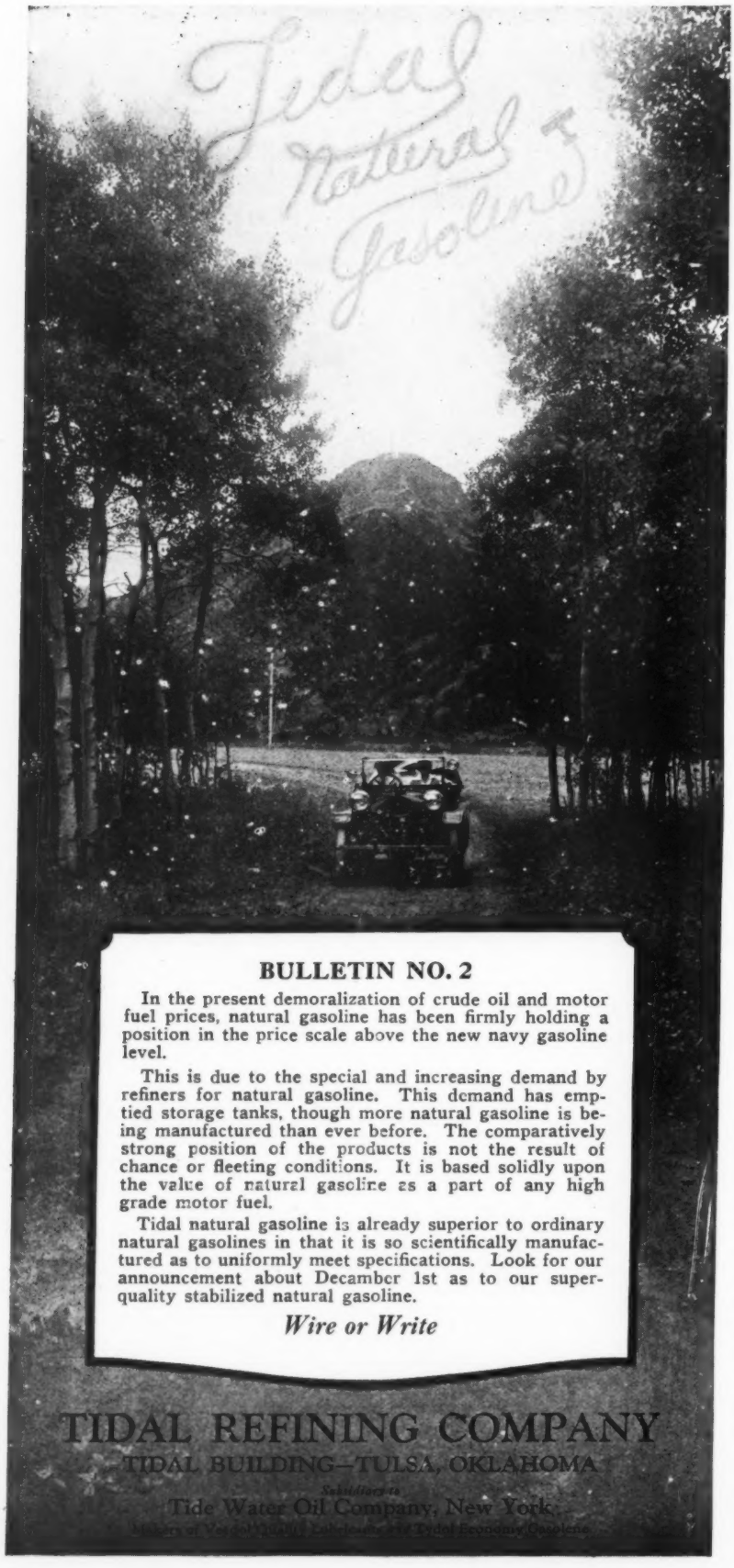

BULLETIN NO. 2

In the present demoralization of crude oil and motor fuel prices, natural gasoline has been firmly holding a position in the price scale above the new navy gasoline level.

This is due to the special and increasing demand by refiners for natural gasoline. This demand has emptied storage tanks, though more natural gasoline is being manufactured than ever before. The comparatively strong position of the products is not the result of chance or fleeting conditions. It is based solidly upon the value of natural gasoline as a part of any high grade motor fuel.

Tidal natural gasoline is already superior to ordinary natural gasolines in that it is so scientifically manufactured as to uniformly meet specifications. Look for our announcement about December 1st as to our superquality stabilized natural gasoline.

Wire or Write

TIDAL REFINING COMPANY
TIDAL BUILDING—TULSA, OKLAHOMA
Subsidiary to
Tide Water Oil Company, New York

Plant and Location—	Capacity	Now Running
Santa Fe Oil & Ref. Co., Ardmor	5,000	S D
Shaffer Oil & Ref. Co., Cushing	6,500	6,050
Sapulpa Ref Co., Sapulpa	7,000	S D
Southern Oil Corp., Yale	6,000	S D
Southern Oil Corp, Walter	2,500	S D
Sun Company, Yale	4,500	2,150
Southwestern Oil Corp., Enid	1,800	S D
Sinclair Ref. Co., Cushing	5,500	S D
Sinclair Ref. Co., Muskogee	2,000	700
Texas-Okla Ref. Co., Grandfield	1,500	1,800
Texas Co., West Tulsa	8,000	6,950
Tex-Pacific C. & O. Co., Wynnewood	5,000	2,000
Tonkawa Pet. Co., Tonkawa	1,500	200
Travis Senter Ref. Co., Comanche	1,500	700
Twin Six O. & R. Co., Grandfield	2,500	S D
Turley Ref. Co., Okla. City	2,500	S D
Wagoner Ref. Co., Wagoner	500	S D
Wilcox Ref. Co., Bristow	500	S D
Yale Oil Corp., Yale	1,200	1,000
Oklahoma total	345,900	114,750

TEXAS

American Oil Corp., Pioneer	2,500	300
American Ref. Co., Wichita Falls	5,000	4,950
H. E. Boner, Burkburnett	700	200
The Petroleum Corp., Electra	2,000	1,000
Buffalo Ref. Co., Sherman	500	200
Burk-Texas Ref. Co., Burkburnett	1,200	S D
Bear Ref. Co., Burkburnett	1,200	S D
Clayton Oil & Ref. Co., Dallas	3,500	1,850
Crystal Pet. Co., Burkburnett	1,000	S D
Eastland-Pioneer O. & R. Co., Cisco	1,000	S D
Empire Refs. Inc., Gainsville	7,000	3,450
General Refs. Inc., Abilene	1,500	S D
General Ref. Co., Wichita Falls	1,500	S D
Gulf Ref. Co., Ft. Worth	15,000	4,950
Gorman Ref. Co., Gorman	1,000	S D
Griswold Ref. Co., Electra	2,000	1,600
Humble O. & R. Co., Burkburnett	1,500	1,000
Humble Refining Co., Powell	10,000	const'r
Invincible Oil Corp., Ft. Worth	5,000	S D
Interstate Gaso. Co., Iowa Park	2,000	700
Iowa Park P. & R. Co., Iowa Park	1,000	600
Keystone Ranger Ref. Co., Wichita Falls	2,000	S D
Lone Star Ref. Co., Wichita Falls	4,000	S D
Manhattan Pet. Prod. Co., Wichta Falls	2,500	S D
Miller Pet. Co., Wichita Falls	2,500	1,750
Magnolia Pet. Co., Ft. Worth	12,500	5,100
Noble O. & G. Co., Burkburnett	5,000	2,950
Nortex Ref. Co., Burkburnett	2,000	S D
North Texas Ref. Co., Greenville	1,000	S D
Owenwood Oil Corp., Burkburnett	2,000	S D
Oriental Ref. Co., Dallas	5,000	600
Oddessa Ref. Co., Ranger	1,000	S D
Orient Pet. Co., Wichita Falls	2,000	400
Pierce Oil Corp., Ft. Worth	10,000	S D
Prairie Ref. Co., Grand Prairie	500	S D
Panhandle Ref. Co., Wichita Falls	4,500	2,150
Associated P. & R. Corp., Ft. Worth	2,000	S D
Primrose Ref. Co., Wichita Falls	1,500	300
Interstate Refs. Inc., Ranger	2,500	S D
Haggeman Ref. Co., Tiffin	2,000	200
Star Ref. Co., Ft. Worth	1,500	300
State Ref. Co., Dallas	1,000	200
Sunshine State Ref. Co., Wichita Falls	2,500	1,500
Tidal Western Ref. Co., Burkburnett	3,000	2,000
Texas Company, Dallas	15,000	7,600
Texhoma O. & R. Co., Wichita Fal's	4,500	3,500
Transcontinental Oil Co., Fort Worth	5,000	1,800
Travis Ref. Co., Burkburnett	1,000	200
Great Texas Ref. Co., Deleon	700	100
Uniform Pet. Co., Burkburnett	4,000	S D
Virginia Ref. Co., Dublin	4,000	S D
Victor Ref. Co., Burkburnett	2,000	S D
Wagoner Ref. Co., Electra	2,500	2,450
Walker Cons. Ref. Co., Iowa Park	2,500	S D
White Eagle O. & R. Co., Ft. Worth	5,000	2,900
Waco Ref. Co., Waco	5,000	S D
World Ref. Co., Bridgeport	800	S D
Texas total	185,600	56,800

Gasoline Stocks in United States on October 1 Totaled 972,694,832 Gals.

STOCKS of gasoline on hand at refineries throughout the country October 1 amounted to 972,694,832 gallons, constituting 40 days supply, states the Department of the Interior as the result of statistics compiled by the Bureau of Mines. The figures represent a decrease of 81,000,000 gallons from the first of the month, at which time 47 days supply was on hand. On October 1, 1922, 37 days supply was available. Gasoline production in September was 623,732,834 gallons, a decrease of 25,000,000 gallons from the previous month's production, but an incerase of approximately 87,000,000 gallons over September, 1922. Domestic demand, or indicated consumption, of gasoline in September was 655,387,616 gallons, which is 37,000,000 gallons less than for August, but 147,000,000 gallons more than for September of last year.

Exports of gasoline in September were 75,647,256 gallons, a decrease of 3,000,000 gallons from the August figures, but an increase of 29,000,000 gallons over the September, 1922, figures. Imports of gasoline in September were 26,150,649 gallons, as against 10,000,000 gallons in August and 4,500,000 gallons in September, 1922.

The new supply of gasoline in September of this year is shown by the Bureau of Mines' figures to be 20 per cent greater than last year, while the total gasoline demand was 32 per cent greater than in September, 1922. The bureau estimates the present gasoline accumulation to represent a surplus of approximately 8 per cent over the normal gasoline supply for the entire country at this date for the past seven years. From the refiners' viewpoint, the situation has improved considerably since May and June, but would not yet seem to warrant increased refining operations.

A further decrease is noted in the number of operating refineries reporting to the Bureau of Mines, there having been 250 plants running to stills a daily average of 1,627,083 barrels of crude oil, representing 79 per cent of their aggregate daily indicated capacity of 2,059,632 barrels.

Kerosene output during September was 193,687,612 gallons, a slight increase over the August figure, while the indicated consumption decreased by about 14,000,000 gallons, amounting to 117,532,944 gallons. About 5,600,000 gallons were withdrawn from storage, the stocks on hand at refineries October 1 being 238,024,012 gallons.

The September production of gas and fuel oils again increased, amounting to 1,032,590,585 gallons. Demand also showed a marked increase during the month. The domestic demand was 923,994,153 gallons, exports 118,546,662 gallons. Stocks increased to 1,481,203,993 gallons.

Lubricants held about the same as in August, the demand exceeding the supply by about 5,400,000 gallons, reducing stocks to 215,013,179 gallons. Production was 87,172,230 gallons, while the demand for domestic use was 61,377,321 gallons, and for shipment abroad 31,207,245 gallons.

Standard Sues Universal In Cracking Process Suit

Chicago, Ill.—A suit of complaint filed by the Standard Oil Company (Indiana) against the Universal Oil Products Company, controller of the Dubbs cracking process, alleging infringement of patents, is the latest development in the legal controversy involving certain oil cracking processes between the two companies. The Standard has filed suit in Federal Court in Chicago and in East St. Louis, the Roxana Petroleum Company (Royal Dutch-Shell) being the defendant in the latter case.

The case has attracted nationwide attention because of the amount of damages sought which runs up into the millions and was originally instituted by the Universal company to protect the Dubbs patent for cracking petroleum. Hearings have been held in Chicago, Kansas City, New York and Los Angeles before Special Master Holmes Hall, who was appointed in 1921 by Judge Van Valkenburgh of Kansas City.

The next hearing of the case is to be November 14 in Santa Maria, California, where distillation processes in two plants entering into the controversy will be tested.

Company Plans New Plant For Pecos Valley Field

Artesia, New Mexico.—It has been announced here that J. C. O'Guinn and associates plan the construction of a refinery and gasoline absorption plant in the Pecos Valley field. Some of the crude and gas for the plants already have been contracted for through the Eureka Oil Company of Artesia which is interested in the projects.

Long Beach Calif.—Plans have been formulated for an increase in capacity of the California Refining Company plant here from 400 to 1650 barrels daily charging capacity. The companies also comtemplate a cement 30,000 barrel reservoir.

Two New Texas Plants Near Completion; Will Add Materially to State's Capacity

Fort Worth, Texas. — Two topping plants with a daily capacity of 7000 barrels of crude each, and a 20,000 barrels daily capacity cracking plant are being completed in different parts of the state within the next 30 days, and will materially add to the potential refinery output of Texas. All of these plants are scheduled to be running capacity by the first of the new year, and sufficient crude to insure steady operation has been provided.

The new cracking plant is that of the Humphreys Pure Oil Company at Smiths Bluff on the Coast, about 16 miles southeast of Beaumont, and when completed will be equipped with 26 units of the Cross cracking process. R. L. Vernor is plant superintendent, and in charge of construction work now nearing completion. Tank farms have already been erected at the plant, and crude stocks are being built up from part of the production of the Humphreys (Pure) Oil Company in the Mexia field, and a pipe line extends from the Mexia field to the plant and tank farm. The full control of this plant was purchased by the Pure Oil Company last September from the Humphreys Oil Company.

One of the 7000 barrels daily capacity skimming plants nearing completion is located at Hearne, in Southeast Texas, and is being erected by the Humble Oil & Refining Company to operate principally on Corsicana-Powell and Mexia crude for fuel oil, which will be delivered on large railroad contracts at Hearne. Humble's East Central and West Texas pipe lines join together at this point and on to the Coast, and assures crude from a widely scattered area.

The Magnolia Petroleum Company is to start operating its 7,000 barrel daily capacity skimming plant at Luling, near the Luling field in Caldwell County section of Southwest Texas, early in November. A large quantity of crude has been purchased and stored at the tank farm near the plant, and a number of contracts for crude have been made in the field over a long period. The principal product will be fuel oil, as the crude in this field is low gravity, and the fuel oil will be applied on large fuel oil contracts made early last summer. The light stuff turned out by the plant is to be shipped via tank cars to Magnolia's refinery at Beaumont, where it will be re-run through Burton stills.

Oriental Takes Over Small Dallas Plant—To Operate

Dallas, Texas.—Crude oil from the Healdton, Oklahoma, field will be used to operate a 3500 barrel daily capacity skimming plant, located at West Dallas, upon the completion of a 5-inch pipe line now being strung by the Magnolia Petroleum Company. This line will be approximately 21 miles in length, and will tap Magnolia's main trunk line leading from Oklahoma to the Coast at a point near Mansfield, located southeast of Magnolia's Fort Worth refinery.

Magnolia has obtained a working agreement with the Oriental Oil Company of Dallas, whereby the skimming plant, which has previously operated under the names of Eastland Oil & Refining Company, Aetna and Trinity Petroleum Corporation, and recently acquired by Oriental is to be furnished with crude purchased and delivered by Magnolia from the Healdton field. Gasoline and other light stocks turned out by the plant are to be handled by Oriental, while the fuel oil will be used by Magnolia in filling numerous contracts made recently with local concerns for a period of one year at a flat rate reported to be around $1.15 per barrel. A few years ago Magnolia ran a small pipe line from its Fort Worth refinery to Dallas to deliver fuel oil to industrial plants and buildings in the latter city, but the line was not successful because of the oil being too heavy and was later taken up.

Long Beach, Calif.—The Big Four Refining Company's plant, with a daily charging capacity of 800 barrels, has been running full capacity since July 1 and all products are sold as produced.

Tank Cars For Lease

All Sizes For All Purposes

You will find tank cars which are especially fitted for your needs among the fleet of over 1,000 cars which North American Car Co. has for lease.

And North American service does not end with the leasing of cars. In addition, you are offered 23 acres of track storage with 5,000-barrel bulk storage at Blue Island, Ill. (within Chicago switching district), 39,000-barrel bulk storage at Clearing, Ill., and 165,000-barrel bulk storage at Tulsa.

Car Repairs

Steel Plate Work

Three complete repair shops at Chicago, Coffeyville and Tulsa are ready to do all kinds of tank car repairing and steel plate work.

North American Car Co.
327 S. LaSalle St., Chicago

Write for further particulars

Car Works:
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Coffeyville
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Southwestern District Office
Petroleum Bldg.,
Tulsa

NORTH AMERICAN CAR CO.

LESSORS OF TANK CARS

Work Starts on Another Refinery for Luling Pool

Luling, Texas. — Construction work has been started by the Mutual Pipe Line Company on a 3,500 barrels daily capacity skimming plant at its tank farm and loading rack on the Southern Pacific railroad about one mile west of Luling. When completed the plant will represent an investment of approximately $75,000, and will be the second one to be added to this particular section of the state recently, as Magnolia Petroleum Company has just completed a 7,000 barrel daily capacity topping plant.

Crude oil from the Luling field is to be used in the plant, and an ample supply is assured through a contract with the United North and South Oil Company, which discovered the Luling field and at present is the largest producer, having about 30,000 acres of leases to develop. The Mutual Pipe Line Company entered the field last August with a line from a loading rack near Luling, and has been shipping oil out in tank cars for fuel.

Headquarters and sales offices of the Mutual Pipe Line Company are established at 715 Maverick building, San Antonio, Texas. The officers are Walter K. Campbell of Tulsa, president; T. W. Sowell of Dallas, vice president; and H. B. May of San Antonio, secretary and general manager.

Skelly Oil Company Adds Two More Gasoline Plants

Tulsa, Oklahoma.—Skelly Oil Company of this city, is now building two gasoline plants that will have a combined output of approximately 18,000 gallons when completed. One plant is located in the Burbank field in the northwest of 11-27-5, on the Osage County side; the other is at Maramec, in Pawnee County.

The plant in the Burbank field was designed with the idea of adding to it at some future time, making it a plant with a large output. At present time construction on 12 units is under way, and when completed, the output of the Burbank plant will be 15,000 gallons.

At Maramec, the plant will be completed within two or three weeks according to present plans. This plant will have a total capacity of 3,000 gallons, and is to be put into operation as soon as the work is finished.

New York, N. Y.—The Standard Oil Company (New Jersey), Standard Oil Company (Indiana), the Texas Company, the Pure Oil Company and the Gasoline Products Company, controller of the Cross cracking process, have settled amicably various interrelated lawsuits growing out of alleged infringements of patents on cracking processes.

New Roxana Refinery to Start Work in December

St. Louis, Mo.—The first units of the Roxana Petroleum Company's modern refinery being erected at Arkansas City, Kansas, may be in operation by the latter part of December. The plant will include four Trumble units and three Dubbs units. Two units of the Trumble operating stills are nearing completion. The plant when completed likely will cost around $4,000,000.

natural gasoline

grade "a"

GRAVITY.....Not below 72° Be.
Not above 78° Be.
E. P.....Not over 375° F.
RECOVERY.....Not less than 90%

grade "b"

GRAVITY.....Not below 76° Be.
Not above 82° Be.
E. P.....Not over 375° F.
RECOVERY.....Not less than 85%

grade "c"

GRAVITY.....Not below 80° Be.
Not above 88° Be.
E. P.....Not above 350° F.
RECOVERY.....Not less than 78%

grade "d"

GRAVITY.....Not below 88° Be.
Not above 92° Be.
E. P.....Not above 350° F.

THE most active and powerful thing in the universe is the infinitesimal particle called the "electron." It is the source of all action and power. The NATURAL GASOLINE constituent of motor fuel is strikingly akin thereto.

If you want power, action, economy and a quick start in your motor on a cold winter's morning add plenty of NATURAL GASOLINE to your motor fuel.

Chestnut & Smith Corporation have large manufacturing, storing and shipping facilities, and can supply your NATURAL GASOLINE requirements promptly in carload or trainload lots at 'most any time.

We shall appreciate the opportunity of quoting you. Be sure and get in touch with us at all times before buying NATURAL GASOLINE.

C&S CORPORATION

grade "1"

GRAVITY.....Not below 58° Be.
Not above 62° Be.
E. P.....Not over 437° F.
RECOVERY.....Not less than 91%

grade "2"

GRAVITY.....Not below 58° Be.
Not above 62° Be.
E. P.....Not over 450° F.
RECOVERY.....Not less than 90%

grade "3"

GRAVITY.....Not below 64° Be.
Not above 66° Be.
E. P.....Not over 440° F.
RECOVERY.....Not less than 88%

grade "4"

GRAVITY.....Not under 66° Be.
Not over 70° Be.
E. P.....Not over 435° F.
RECOVERY.....Not less than 8[illegible]%

CHESTNUT & SMITH CORPORATION

GENERAL OFFICES - CHESTNUT SMITH BLDG. - TULSA OKLA.

Whiting Memorial Community House Is Dedicated at Indiana Refining Center

Whiting, Indiana, Nov. 12. — The Whiting Memorial Community House, a gift to the city of Whiting, Indiana, by the Standard Oil Company (Indiana), John D. Rockefeller, Sr., and John D. Rockefeller, Jr., was dedicated here today. The building was erected in memory of those who served in the World War, and the dedication exercises were under the auspices of the American Legion, Whiting Post No. 80, which has a membership of 400. Mayor Walter Schrage of Whiting declared Monday a holiday.

The great refineries of the Standard Oil Company (Indiana) are located at Whiting, where about 4,300 people are employed. Five hundred and eighty Standard Oil Company (Indiana) employes enlisted in the World War.

The building alone cost $500,000. Of this amount the Standard Oil Company (Indiana) contributed $325,000. John D. Rockefeller, Sr., $100,000, and John D. Rockefeller, Jr., $75,000. The furnishings cost $60,000, and it is claimed that it is the finest community house in the United States.

The building, which has two stories and a full basement, is of rough texture of brick in various shades of red, laid with cream color mortor joints. The architecture is an adaptation of the Southern Italian style. The roof is of Spanish tile. The entire building in appearance is one of quiet and commanding dignity, inviting in its simplicity and unconventional contour.

The building has three main divisions, so arranged as to accommodate the various activities. There is an auditorium, with seating capacity of 1,000, for lectures, concerts, motion pictures, choral recitals, dramatics, and entertainments of every kind.

In order that it may be operated either in connection with or independent of the other departments, it has a separate entrance from the street, as well as one on the interior connecting it with the other sections of the building. The auditorium stage is fully equipped with the necessary paraphernalia for any kind of an entertainment.

There is a spacious and inviting general lobby 42x43 and a general social room 30x50 feet with administration offices and secretary's counter at the opposite end. Adjacent to the lobby are the billiard room, with eight tables, social and reading rooms and refreshment lobby. Wide corridors leading from the general lobby offer access to the spectators gallery of the swimming pool and the men's gymnasium.

Below the men's department are the lockers and shower rooms, eight regulation bowling alleys, and a dining room with a capacity of 250, and the boys' department.

On the second floor is a large general club room, the beautiful memorial hall with trophy cases and appropriate mural decorations, and adjacent rooms to be used by the American Legion as their headquarters. To the rear of the same floor is the running track of the men's gymnasium, boxing and wrestling room and a regulation hand-ball court.

Established 1867

The Vilter Manufacturing Co.

1152-1162 CLINTON ST., MILWAUKEE, WIS.

Vilter High Speed Horizontal Refrigerating Machine

Builders of Refrigerating Machinery, Oil Cooling Coils, Gasoline Condensers, Etc.

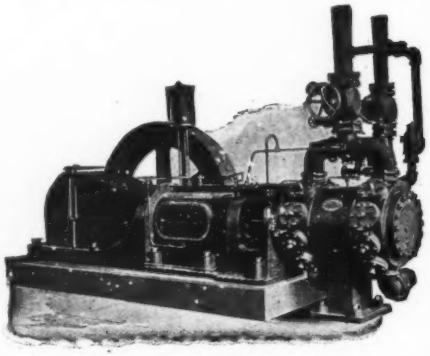
Vilter Equipment is used in many of the oil refineries.

Vilter-Milwaukee typifies the true standard of reliability in machinery construction and refrigerating engineering.

Vilter Low Temperature Compression System (for efficiently producing low temperatures with compression system.)

Vilter Sales Engineers always at your service.

Branch offices in all the principal cities.



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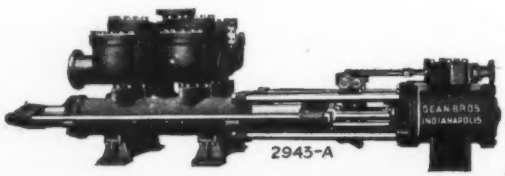
OIL PUMPS
For Hard Continuous Service

The pumps will not short stroke. Are substantially and carefully built. Have large and free passages which do not restrict the flow. Extremely economical in the use of steam.

Send for Catalogue.



Combination Plant for Monroe Field, Louisiana

Bastrop, La.—The combination carbon black and natural gasoline manufacturing plant under construction here by the U. S. Carbon Company is expected to be operating full capacity by the first of the year. These plants are to have a capacity of about 10,000,000 cubic feet of gas daily, and are connected with a large number of gas wells in the Bastrop section of the Monroe gas field by extensive gathering lines. The absorption process is used in the natural gasoline plant, and the gas tests about one-quarter of a gallon of gasoline per 1000 cubic feet.

In connection with these two plants a pipe line company has been organized under the name of the Excelsior Pipe Line Company, and is constructing a gas line from Bastrop to West Monroe to furnish gas to a large paper and pulp mill and other industries in West Monroe. Headquarters of both concerns are maintained at Bastrop, while Henry C. Morris of Dallas is trustee in charge of construction work.

Arkansas City, Kans.—Noco Petroleum Company as the successor to the National Oil Company has taken over the Lesh Refining Company plant here and is preparing to install a cracking process before placing the refinery in operation.

Chestnut and Smith Have Explosion in Texas Plant

Ranger, Texas.—An explosion originating in the engine room of the natural gasoline manufacturing plant No. 108 of the Chestnut & Smith Interests in northern part of Eastland County October 29 resulted in serious injuries being sustained by three employes and almost complete demolishment of the engine room and its equipment. The injured workmen are: Sid Williams, chief engineer; H. J. Haney and G. H. Seibert, engineers. Although these men were badly burned, their recovery is almost assured, and it is expected that they will be able to throw some light on the cause of the explosion when their bandages are removed.

The plant is located a remote distance from the city, and the three injured workmen were the only ones present at the time of the explosion. Although suffering intensely from burns, one of the workmen succeeded in summoning aid by telephone. A unit of the Ranger fire department and employes of Chestnut & Smith at other gasoline plants in the district, assisted by a corps of volunteer firemen brought the fire under control, and confined the damage largely to the engine room. Actual property damage sustained by the company is expected to exceed $100,000, while losses on gas contracts while the engine room is being replaced will greatly augment this figure.

California Has 88 Gasoline Plants Operating in October

Los Angeles, Calif.—There were 88 natural gasoline manufacturing plants operating in Southern California the first week in October according to a check conducted by Victor W. Killick, statistician for the Independent petroleum Marketers Association. The 88 plants had a daily capacity of 631,500 gallons, but the output for August was only 458,250 gallons a day.

The plants were distributed among the fields as follows: Santa Fe Springs, 27; Signal Hill, 21; Huntington Beach, 20; Salt Lake, 5; Ventura County and Newhall, 9; Whittier, Montebello, La Habra and Fullerton, 7; Olinda, 4; Richfield, 2; Torrance, 2; Brea, 11.

The following table gives the production by day for July and August by fields, showing the percentage of the whole that was produced by each field:

Fields	—Production Gallons— July	August	Per Cent
Coyote Hills	48,915	42,283	.3
Fullerton	279,706	507,986	3.7
Hunt'gt'n Beach .	2,753,473	3,209,070	23.4
Long Beach	2,981,784	3,515,872	25.6
Montebello-Whittier	55,738	51,633	.4
Newhall	18,600	23,250	.2
Richfield	276,040	265,280	1.9
Salt Lake	98,183	102,645	.8
Sante Fe Springs.	5,008,334	5,731,532	41.6
Ventura	276,836	287,353	2.1
Totals	11,797,609	13,736,904	100

Toronto, Canada—Operations at the Imperial Oil Ltd., new refinery at Calgary, likely will begin during November, according to present plans. Some 50,000 barrels of oil already are in storage at the refinery which is modern in every respect. The plant will draw its supply of crude from the Wyoming and Montana fields.

The Fulton Vacuum Regulator

Maintains a fixed vacuum in a well when desired.

Can be used either as a vacuum regulator or a back pressure regulator by merely changing the position of the lever.

As a vacuum regulator will close when vacuum in the well rises to a given point.

The Chaplin-Fulton Mfg. Co.

30 Penn Ave., Pittsburgh, Pa.

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"UNITED DESIGN"

SEND US INQUIRIES FOR

Storage Tanks — Towers — Pipe Line Supplies
Complete Refineries — Condensors — Stills — Flanged Fittings
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Quotations Promptly Sent

UNITED IRON WORKS, Inc.

KANSAS CITY, MO.

TULSA, OKLA. **DALLAS, TEX.**

"UNITED" IRON WORKS INC. FOR SERVICE

STATEMENT OF THE OWNERSHIP, MANAGEMENT, CIRCULATION, ETC., REQUIRED BY THE ACT OF CONGRESS OF AUGUST 24, 1912

Of The Refiner and Natural Gasoline Manufacturer, published monthly at Houston, Texas, for October 1st, 1923.

State of Texas
County of Harris, ss.

Before me, a notary public in and for the state and county aforesaid, personally apeared A. L. Burns, who, having been duly sworn according to law, deposes and says that he is the treasurer of The Refiner and Natural Gasoline Manufacturer and that the following is, to the best of his knowledge and belief, a true statement of the ownership, management (and if a daily paper, the circulation), etc., of the aforesaid publication for the date shown in the above caption, required by the Act of August 24, 1912, embodied in section 443, Postal Laws and Regulations, printed on the reverse of this form, to wit:

1. That the names and addresses of the publisher, editor, managing editor, and business managers are: Publisher, The Gulf Publishing Company, Houston, Texas; editor, R. L. Dudley, Houston, Texas; associate editor, S. W. Robinson, Houston, Texas; business manager, R. L. Dudley, Houston, Texas.

2. That the owner is: (If the publication is owned by an individual his name and address, or if owned by more than one individual the name and address of each, should be given below; if the publication is owned by a corporation the name of the corporation and the names and addresses of the stockholders owning or holding one per cent or more of the total amount of stock should be given.)

Jas. Anderson, Houston, Texas; R. L. Blaffer, Houston, Texas; Mrs. S. C. Blaffer, Houston, Texas; A. L. Burns, Houston, Texas; H. W. Draper, Houston, Texas; Dr. N. L. Dudley, Goose Creek, Texas; R. L. Dudley, Houston, Texas; B. V. Ellzey, El Paso, Texas; W. S. Farish, Houston, Texas; D. H. Freel, Casper, Wyo.; Dr. J. L. Gross, Kansas City, Mo.; Walter C. Hardcastle, Houston, Texas; Howard R. Hughes, Houston, Texas; Chas. H. Lane, Houston, Texas; W. B. Larkin, Wichita Falls, Texas; J. H. McEvoy, Houston, Texas; J. H. McEvoy, Jr., Houston, Texas; H. A. Miles, Fort Worth, Texas; C. F. Mirus, Tampico, Tamps., Mexico; Mrs. J. B. Moore, Houston, Texas; David M. Picton, Jr., Houston, Texas; Wallace E. Pratt, Houston, Texas; Spencer W. Robinson, Houston, Texas; J. E. W. Schneider, Houston, Texas; C. N. Scott, Houston, Texas; R. S. Sterling, Houston, Texas; Jno. R. Suman, Houston, Texas; Wm. A. Vinson, Houston, Texas; E. C. Waldvogel, Pelham, New York; Bud Waller, Chicago, Ill.; C. F. Williams, Humble, Texas; E. E. Watts, Houston, Texas; G. C. Wood, Houston, Texas; R. L. Young, Houston, Texas; R. E. Connell, Pittsburgh, Pa.

3. That the known bondholders, mortgagees, and other security holders owning or holding 1 per cent or more of total amount of bonds, mortgages, or other securities are:

H. C. Weiss, Houston, Texas; Jas. Anderson, Houston, Texas; Howard R. Hughes, Houston, Texas; R. L. Blaffer, Houston, Texas; W. S. Farish, Houston, Texas; Chas. H. Lane, Houston, Texas; John Hammon, Houston, Texas; R. S. Sterling, Houston, Texas; Maurice Hirsch, Houston, Texas.

4. That the two paragraphs next above, giving the names of the owners, stockholders and security holders, if any, contain not only the list of stockholders and security holders as they appear upon the books of the company, but also, in cases where the stockholder or security holder appears upon the books of the company as trustee or in any other fiduciary relation, the name of the person or corporation for whom such trustee is acing, is given; also that the said two paragraphs contain statements embracing affiant's full knowledge and belief as to the circumstances and conditions under which stockholders and security holders who do not appear upon the books of the company as trustees, hold stock and securities in a capacity other than that of a bona fide owner; and this affiant has no reason to believe that any other person, association or corporation has any interest direct or indirect in the said stock, bonds, or other securities than as so stated by him.

A. L. BURNS, Treasurer.

Sworn to and subscribed before me this 5th day of November, 1923.

(Seal) ALJEAN McBRAYER.

(My commission expires June, 1925.)

Hanlon Gasoline Company Purchases Two Texas Plants, Which Will Be Improved

Breckenridge, Texas.—The Hanlon Gasoline Company, a newly organized concern with headquarters at Tulsa, Oklahoma, has purchased the two natural gasoline manufacturing plants operated near Breckenridge by the Hipower Gasoline Corporation, and is preparing to make changes that will represent an expenditure of more than $1,000,000, including the purchase price of the plants. The Hanlon Gasoline Company is affiliated with the Chestnut & Smith Interests, pioneers in the natural gasoline industry in the Mid-Continent, and has the following officers: E. I. Hanlon, president; T. K. Smith, vice president; J. H. Boyle, secretary; D. E. Buchanan, treasurer; and Tom Coyle, general superintendent of plants.

The two plants acquired by the Hanlon Gasoline Company include a 5,000,000 cubic foot daily capacity absorption plant on the J. M. Martin lease, a short distance north of Breckenridge, and a 15,000,000 cubic foot daily capacity plant on the J. R. Smith lease, located about two miles southeast of Breckenridge. The new owners have announced that the small plant on the J. M. Martin lease will be dismantled and all of its gas connections diverted to the nearby plant of Brooks & Hanlon, Inc., (also Chestnut & Smith interests), while the latter concern's plant is adding five engines and compressors to handle the additional gas. The large plant on the J. R. Smith lease is to be rebuilt by the Hanlon Gasoline Company, and made the nucleus for new construction that will add about 12,000,000 cubic feet daily capacity to its former facilities, while it is contemplated to increase this plant in size to 45,000,000 cubic feet daily capacity by next spring. In addition to the gas connections already held by this plant, the Hanlon Gasoline Company has obtained contract with The Texas Company for its surplus gas production on the J. W. Parks ranch, and other operators on leases south of the Parks ranch. Extensive gas gathering systems will be constructed to handle this gas, while it is planned to erect two booster stations with a capacity of from 12 to 14,000,000 cubic feet daily.

TULSA BOILER & SHEET IRON WORKS

PIONEER TANK & BOILER COMPANY

A New Name for an Old Friend

WHAT'S in a name, anyway? The refinery construction work we are doing under the name "Pioneer" is just the same high grade as when it bore the name "Tulsa Boiler and Sheet Iron."

For eighteen years, as the "Tulsa Boiler and Sheet Iron Works" we have turned out tanks and refinery steel construction that made good friends for us among the wise buyers of the Mid-Continent. We pioneered in giving these people "close to home" service on the best kind of work.

Now, under the new name, The Pioneer Tank and Boiler Company, we're all set with the men, machinery and money to keep on growing under the Pioneer banner like we did when Tulsa Boiler and Sheet Iron was on our letterhead.

There is no change in our organization.

Get Pioneer quotations on tank and refinery construction work.

PIONEER TANK & BOILER COMPANY
(Formerly Tulsa Boiler and Sheet Iron Works)
Box 1926, TULSA, OKLA.

New Catalog Out on Dow Special Hot Oil Pump

A bulletin, descriptive of the Dow Special Hot Oil Pump, has been issued by the Dow Pump and Diesel Engine Company, manufacturers of the pump, which is a Thompson patent.

Copies of the bulletin are available from the manufacturer at Alameda, California, or from the Menge Pump & Machinery Co., Ltd., exclusive selling agents in Eastern territory, 862 Tchoupitoulas street, New Orleans, Louisiana.

The Dow Special Hot Oil Pump is designed to handle liquids up to temperatures of 800 degrees F. The handling of hot asphaltum from stills through heat exchangers to tanks, the circulation of oil at high temperatures through coils or stills for breaking viscosity, the transferring of hot residuum from stills at high temperatures, are some of the uses given the pump in the bulletin.

It doesn't matter whether the charging stock is Topped Oil, with or without the Kerosene, or whether it is Gas Oil or Residue from California crude or from Texas, from Oklahoma or Louisiana, from Arkansas or Kentucky, from Pennsylvania or West Virginia, from Montana or Wyoming—the results are all about the same when cracked by the Dubbs process

Mid-Continent 24-25 gravity Fuel Oils run direct to and only once through the Dubbs Cracking Process are regularly yielding in excess of 40 per cent of good new Navy IBP-EP gasoline and without the expense, the equipment and the loss of any pre-treatment or pre-distillation to prepare the stock for cracking

It just eats it raw

Universal Oil Products Company
Owners of the Dubbs Process
208 South La Salle Street Chicago

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Refiners' Supplies

	Nov. 15
Soda Ash light 58% ....cwt.	$1.38–1.50
Silicate of Sola 60 deg. bbls....cwt.	1.70
Sal Soda wks ....cwt.	1.10–1.30
Caustic Soda 76% ....cwt.	3.10–3.25
Chloride of Lime solid....cwt.	1.25–1.50
Sulphuric Acid 60 deg. tank cars f. o. b. shipping point....per ton	9.00–11.00
Benzol—	
Pure Water White ....Tanks....gal	.23 —.28
Drum...gal.	.28 —.33
90% ....Tanks...gal	.21 —.26
Drums...gal	.26 —.31

Jobbers' Supplies

Vegetable Oils—	
*Linseed, carloads Spot....gal.	—.92
Nov.-Dec. ....gal.	—.90
Less carload Spot ....gal.	—.95
5 bbls. or less Spot ....gal.	—.98
Boiled, tank Spot ....gal.	—.88
Boiled, carloads Spot ....gal.	—.94
Soya Bean Spot, Tanks ....lb.	—.09¾
Animal Oils—	
English Degras ....lb.	$—.04¾
Domestic Degras, bbls., carloads ...lb.	—.04
Horse ....lb.	—.08
Oleic Acids—	
Dist ....lb.	—.09½
Saponified ....lb.	—.09½
Lard Oils—	
Prime	
Winter	
Strained .. 1 to 1¼ ffa. 40/45c. t. lb.	$.16¼
Extra	
Winter	
Strained . 2 to 4½ ffa. 40/45c. t. lb.	.13¾
Extra....4 to 5 ffa. 40/45c. t. lb.	.12¾
Extra No. 1....7 to 10 ffa. 40/50c. t. lb.	.11
Extra No. 1....7 to 10 ffa. 40/50c t. lb.	.11
No. 2 ....22 to 23 ffa. 40/45c. t. lb.	.10
Prime Edible Tallow under 1½ ffa. 40/45c. t. N. Y. ....lb.	.09¼
Tallow acidless ....lb.	11½
Lard Stearine ....lb.	.15½
Oleo Stearine ....lb.	12¼
Neatsfoot Oil—	
Pure ....bbls.-lb.	.13¾
Extra ....bbls.-lb.	11
No. 1 ....bbls.-lb.	10½
Cold pressed ....lb.	.16½
Fish Oils—	
Menhaden Oil	
Light pressed ....gal.	$ —.65
White ....gal.	—.70
Yellow bleached ....gal.	—.68
*Herring, tankcars coast ....gal.	—.40
Whale, extra winter bleached ....gal.	—.81
Seal	Nominal
Naval Stores—	
Turpentine, N. Y. ....gal.	1.00
Turpentine† ....gal.	—.92¾
Rosin B. N. Y. ....Bbl.	5.80
Rosin F. N. Y. ....Bbl.	5.80
Rosin B.† ....Bbl.	4.42½
Rosin F.† ....Bbl.	4.42½
Rosin Oil 1st run ....gal.	.44
Rosin Oil 2nd run ....gal.	.46
Pine Tar—	
Kiln Burnt ....Bbl.	11.00
Retort ....Bbl.	11.00

*Nominal
†Savannah, Ga., market.

One of Largest in State Now Operating at Ibex

Breckenridge, Texas.—Representing an investment of approximately $500,000, the natural gasoline manufacturing plant completed early this month by the Landreth Gasoline Company in the Ibex field, Shackelford County, has a daily capacity of 50,000,000 cubic feet of gas, and ranks among the largest in the state. The plant was designed and constructed by W. L. Seeley, a well known engineer in the national gasoline manufacturing industry, and is equipped with 165 H. P. Bessemer engines and 16x16 Ingersoll-Rand compressors. The absorption process is used in extracting the gasoline, and the plant is in four units. Several units were completed some time ago, and have been in operation continuously.

"The Scope of Our Service"

Our business has outgrown the name so far that few people realize the scope of our service. For the Oil Industry alone we manufacture the following products:

Storage Tanks (any capacity)
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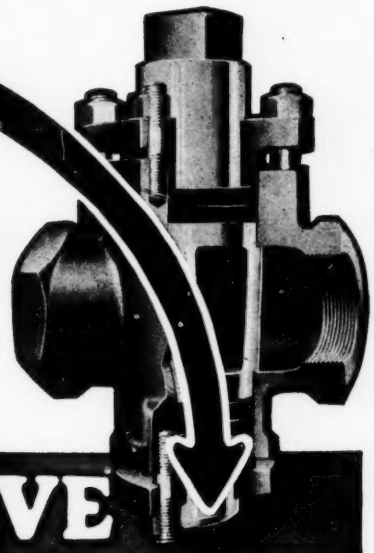
VICTORY

FcH DOUBLE PACKED STOP COCK VALVES



The projecting stem makes A BETTER VALVE

A VALVE which is stuck is worse than useless. Use Victory Double Packed Stop Cock Valves and avoid such trouble. See the projecting stem? It doesn't take much of a rap on this stem to loosen the most tightly frozen cock, and no amount of hammering will damage this valve. The projecting stem is put there for just that purpose.

What is more, you can't drive the plug out and cause a leak. The packing in the upper suffing box takes care of the shock, and holds the plug down where it belongs.

Proper means of adjustment is your insurance against leakage in the Double Packed Valve. Note the adjustment by means of the two glands, one at each end of the plug.

Victory Valves are made in a variety of sizes, materials and designs to cover a wide range of industrial and refinery requirements. Ask us to tell you more about them.

Catalog sent on request

Victory Manufacturing Company

100 Main Street **Niles, California**

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V. A. Houghton Co., 566 W. Washington Blvd., Chicago, Ill.

Western Supply Co., Tulsa, Okla.

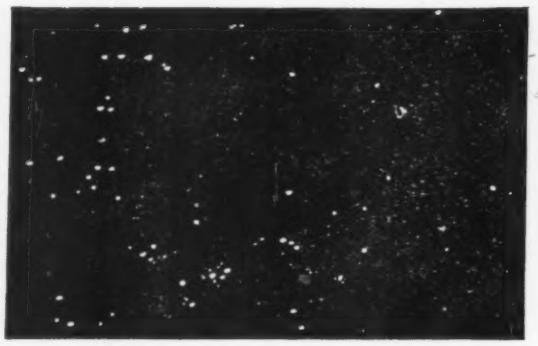
Norvel-Wilder Co., Beaumont and Houston, Texas.

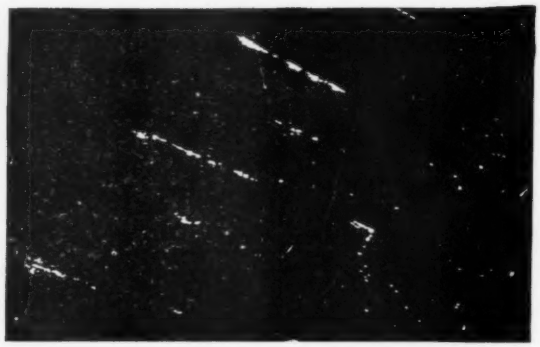
Engr. Equipment Co., 817 Union League Bldg., Los Angeles, Calif.

G. J. Gillespie, Suffolk House, 5 Laurence Pountney Hill, London, E. C. 4.

The Weakest Spot in Your Tank

Is the Underside of its Roof





NO—Gentle reader, these are not pictures of the stars or comets, but just show God's good sunlight shining through holes eaten *from the inside,* through the roof of an eight months old 65000 bbl. storage tank.

YES—This was an extreme case where the oil stored was a high sulphur content Mexican Panuco Crude, *but* unseen; the same rusting or eating of the metal to an equal or less degree is taking place on the underside of a vast majority of storage tanks.

WHY—Because sulphur fumes, gases and moisture condense on the underside of the roof and supports and thrive on the bare or improperly painted metal, which, the tank once filled, is hard and expensive to clean and repaint.

STOP it? Sure,—by using a suitable Paint Primer (No. 32L) and

Degraco Products

Tank Paints
Head Liner Enamels
Tank Car Paints
Pipe Line and Station Finishes
Superior Graphite Paint
Sta-White
Degraco Paints for Houses
Degraco-Tone

Degraco No. 16 Head Liner Enamel

No. 16 is an enamel finish interior paint which resists the action of fumes and condensation of even Mexican crudes. It should be used on the underside of the roof and supports of every new (or old where possible) storage tank.

May we send you cost figures and facts?

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